Chairman's handwritten corrections inserted in this copy

RPTR LEESMAN

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IMPACT OF NATIONAL SECURITY
CONSIDERATIONS ON SCIENCE AND TECHNOLOGY

Monday, March 29, 1982

House of Representatives
Committee on Science and Technology
Subcommittee on Science, Research and
Technology, and
Subcommittee on Investigations and Oversight
Washington, D.C.

The subcommittees met in joint session, pursuant to call, at 9:00 a.m., in Room 2318, Rayburn House Office Building, Hon. Doug Walgren [chairman of the subcommittee on Science, Research and Technology] presiding.

Mr. WAIGREN. On behalf of Congressman Gore and myself, I want to welcome you to these hearings. We are both pleased to co-chair these hearings as chairmen of our respective subcommittees, on my side the Science, Research and Technology Subcommittee, and on Mr. Gore's side, the Subcommittee on Oversight and Investigation.

We also want to recognize the role of Congressman Glenn English, who is Chairman of the Subcommittee on Government Information and Individual Rights, who held hearings on March 10th on the proposed Executive Order on National Security Information.

In February, Congressman English and myself, Congressman Gore and several other subcommittee chairmen, sent a joint letter to the National Security Advisor, William Clark, asking for an adequate opportunity for Congress to look carefully at any new directives on the international exchange of scientific information. Although our hearings today will focus on a number of proposals by the Administration, I am afraid our discussions will be hindered by the absence of a representative of the National Security Council, which declined to provide us either with a witness or a current draft of the Executive Order presently under review.

Our purpose today is to determine the impact on science and technology of recent Administration proposals for

increased control of potentially sensitive technology and scientific data. The proposals for tightening control over scientific exchanges, the export of technology, and the free flow of information are being put forth by the Administration in the name of nation security.

Now, no one would question the need to protect information of direct military importance in the interest of national security. But certainly we all have concerns that the Administration may not have done a careful and comprehensive and open analysis of the total impact of the various actions on science and technology as well as the impact on achieving economic, political and societal goals as a whole.

Both security and scientific issues are complex and difficult. Scientific censorship is an anathema to a free society, but certainly circumstances do dictate that we find a solution to the balance we must strike between national security and the exchange of scientific and technical information. This balance is critical to safeguarding and maintaining the quality of academic research and industrial competitiveness in the United States.

Unnecessary and overly restrictive barriers to scientific communication in the international arena would, by its very nature, also curtail domestic exchange, even though the ultimate intent of such a policy may be strictly for national security. Thus, we must be careful to ensure that

such actions do not become more costly to our own vitality in science and technology than the benefits which may be realized by limiting foreign access or exchange between persons.

Moreover, whatever the theory is in restricting technological exchange, history has taught us that actual implementation by a bureaucratic organization can result in the most bizarre and arbitrary of actions. We cannot assume that the designated censors will represent the best and judicious aspects of our society.

To develop a proper balance between government policies that enhance and those that protect critical scientific and technological information, we must first ask ourselves what we are trying to accomplish in our relations with the Soviet Union and the Eastern bloc. We could then perhaps more intelligently respond to the question before us--how, if at all, science and technology, either free or forbidden, might contribute to our national goals.

We will be anxious to learn from the Administration witnesses how they plan to protect the flow of information without suppressing legitimate and necessary scientific exchange. Our country has enjoyed a bright history of innovation, and when we look at our society as a whole and see the other societies we are competing with, one of the brightest prospects in America is the fact that because of

our free exchange we have made the breakthroughs. The more our exchange of information becomes less free, the less we can count on making the kinds of critical breakthroughs that may be very important in every sense of our national interest.

We will also be interested in the process used to coordinate policy decisions among the various Executive Branch agencies responsible for national security, and the extent to which guidance was sought from the scientific and industrial communities, including the Science Advisor to the President. So we have a wide range of ground that we would like to cover, and we certainly appreciate the witnesses being here today.

I want to recognize the co-chair of these hearings, Congressman Gore, the chairman of the oversight and investigations subcommittee of the Committee on Science and Technology, for his comments.

Mr. GORE. Thank you very much.

The United States has long enjoyed the benefits from the competitive edge it possesses in vast areas of science and technology. Almost every aspect of our lives has as well become increasingly tied to the course of scientific and technological advancement, including most importantly our national security.

It has been argued by some that unrestricted exchange of

scientific information is central to a free society and to scientific advancement as well. While accepting the general idea of free exchange of information, others have argued that certain situations may involve the transfer of information which can have an impact on national security, and that such information flow should be restricted.

The issues which are the subject of our hearing today are both difficult and sensitive. They probe the very life force of a democratic society such as ours--freedom of speech and freedom of information, as well as how to safeguard this freedom.

Our wintesses today will help to more clearly identify the interest at stake and the potential points of conflict and, by doing so, will hopefully assist in the process of finding an appropriate balance for a free society.

As I mentioned, the United States has been at the forefront of technological innovation. The Soviet Union, however, has also benefited from Yankee knowhow and ingenuity through open scientific exchange with the United States and, more often than not, by availing itself of the generally unrestricted access to information citizens of this country enjoy. Recent actions of the Administration have been designed to affect greater control over the flow of information, technology, materials and individuals than has previously existed. These actions include revisions in

the wording and implementation of export control regulations and in proposed revisions to the Executive Order on National Security Information which strengthen and broaden authority to restrict dissemination of information.

The restrictions derived from these policy decisions are aimed at the free flow of technological information as well as products of technology. Such actions deserve our careful attention, and there is a need to assess whether these measures will have unintended and serious side effects.

Mr. Chairman, I am glad to welcome our first witnesses here this morning, and I wanted to take special note that Mr. Millburn and Mr. Brady and Admiral Inman have provided testimony because of our request. As a member of the Intelligence Committee, I wanted particularly to welcome Admiral Inman and advise my colleagues who have not had the opportunity to work with him in such a forum that he has an unusual degree of respect among the Members of Congress that have worked with him.

As I told you in a private conversation, Admiral Inman, the perception of your statement which occasioned this hearing most directly I think was somewhat uncharacteristic of the relationship you have had with the Congress and the public generally, and as I told you at that time, I am looking forward to an opportunity to explore exactly what the issues are here.

Thank you, Mr. Chairman.

Mr. WALGREN. Thank you, Mr. Gore.

I would like to recognize Congressman Brown for any opening comments.

Mr. BROWN. I have no comments.

Mr. WALGREN. We will, without objection, keep the record open at this point for other statements that members of the committee who may not be able to be here right now might want to submit.

Mr. WALGREN. I would like to turn to the first panel, made up of Admiral Inman, the Deputy Director of the Central Intelligence Agency, and the Honorable Lawrence Brady, Assistant Secretary for International Trade Administration with the Department of Commerce, and Dr. George Millburn, the Acting Deputy Under Secretary for Research and Engineering of the Department of Defense.

Gentlemen, we are very pleased you are here today. It is my understanding we are going to try to keep the opening remarks to something in the range of ten minutes, if that is acceptable. Your written statements will be made a part of the record automatically.

Let's start with Admiral Inman and then go from there in either summarizing or presenting your thoughts to the committee in whatever way you feel is most effective.

STATEMENTS OF ADMIRAL BOBBY R. INMAN, DEPUTY DIRECTOR, CENTRAL INTELLIGENCE AGENCY; HON. LAWRENCE J. BRADY, ASSISTANT SECRETARY, INTERNATIONAL TRADE ADMINISTRATION, DEPARTMENT OF COMMERCE; AND GEORGE MILLBURN, ACTING DEPUTY UNDER SECRETARY FOR RESEARCH AND ENGINEERING, DEPARTMENT OF DEFENSE; ACCOMPANIED BY LEO YOUNG, DIRECTOR OF RESEARCH AND TECHNICAL INFORMATION, AND FRANK KAPPER, DIRECTOR OF MILITARY TECHNOLOGY, OFFICE OF INTERNATIONAL PROGRAMS AND TECHNOLOGY

STATEMENT OF ADMIRAL INMAN

Admiral INMAN. Thank you, Chairman Walgren and Chairman Gore.

I appreciate the opportunity to appear before this committee this morning and to expand on my previous public remarks, where I undertook (on a personal basis) as a knowledgeable, ~~personal~~ citizen to serve as a ''goad'', and I am here to play that same role again here today.

If I may, I would like to enter for the record, in lieu of a formal statement, a summary of the remarks I made before the American Association for the Advancement of Science, as contained in a publication called Science News.

I had not previously known of the publication or of its reporter, but I would particularly like to call it to your attention for two reasons: one, for the short, accurate summary of views at that symposium, and secondly, as a plug for accuracy. It is the only reporting that accurately reflected what was said on that occasion, as you will see when you peruse the document.

Mr. WALGREN. Without objection, that will be entered in the record. I can guarantee you that no one more appreciates the divergence from accurate reporting than Members of Congress that we sometimes experience.

[The information follows:]

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233 ********** INSERT 1-1 **********

Mr. GORE. Mr. Chairman, I think it would also be appropriate, without objection, to put the text of the statement itself in the record, this account following it.

Admiral INMAN. Thank you, sir.

[The information follows:]

********** SUBCOMMITTEE INSERT **********

Admiral INMAN. As you will note, those were my personal views. They did not represent that of either the Administration or the intelligence community, and that is the same situation which prevails today. I deliberately have not coordinated my remarks with either of my colleagues that are here, so we come to you as independent representatives in a forum to provide you with both information and hopefully some useful ideas.

In an open society, there is a tendency to automatically take the view that one cannot debate the substance of issues unless you see the evidence. But when one is dealing with the product of collection against a massive Soviet effort, it is difficult to convey the sense of the knowledge without revealing how we got that knowledge, and it is going to be critical in the months and years ahead that we retain that ability to collect.

I have been hard at work, nonetheless, in trying to draw from the intelligence community an unclassified summary of our knowledge of Soviet efforts to obtain Western technology, and ~~to~~ use it ultimately to improve their own military capabilities. I have gotten several suggested statements, but they contain, in my view, too little fact to, ~~in fact,~~ engage the concern of the public as it needs to be engaged. There is a final version that I have looked at over the weekend and it is about ready to go. With the

interest of the committee, I will forward to you, hopefully within the next week or two weeks, a summary of the unclassified intelligence from a community perspective, not just CIA, which you may find helpful as you continue to consider this overall issue.

Mr. GORE. Mr. Chairman, I would ask unanimous consent that we hold the record open for inclusion of that material, but I must note for the record also, Admiral Inman, again as I told you in a private conversation, I have pursued the classified version of this data at some length in the Intelligence Committee and I think if the classified version were made public, it would still fall short of the so-called ''tidal wave'' that was referred to. But we can pursue that later.

Admiral INMAN. Thank you.

Let me try to summarize an aggregate for you the kinds of problems we deal with, and then let you focus your hearings as you choose on various elements of it.

As we look at the militarily useful, militarily related technology which the Soviets have acquired from the U.S., principally from the West, I would roughly categorize about 70 percent of that acquisition as having been accomplished by the Soviet intelligence services. You may well have a representative of the services present this morning, and if you can get their testimony you might get a more accurate

291 percentage. But in the absence of that, I'll give you about
292 70 percent as a reasonable figure to use.
293 The bulk of that is concentrated on trying to get directly
294 military hardware, either through direct espionage, through
295 open purchase ~~openly~~ and, if not successful, then illegally, of
296 actual components or designs, and a very thorough vacuum
297 cleaning of anything available in the public sector which
298 will let them concentrate their espionage activities.
299 Of the remaining 20 to 30 percent of the acquisition of
300 information of value to the Soviets, a small percentage
301 comes from the direct technical exchanges conducted by
302 scientists and by students.
303 The concentration by the Soviets ~~have~~ has been on illegal
304 trade diversions and collection directly against defense
305 contractors and high technology firms working in advanced
306 technology, both classified and unclassified, foreign firms
307 and subsidiaries of U.S. firms abroad, and international
308 organizations with access to advanced and/or proprietary
309 technology. They are placing a high priority on the
310 collection of science and technological information, on
311 ~~lazars~~ lasers, particle beams and genetic engineering. They are
312 also stepping up their efforts to acquire new and emerging
313 technologies such as very high-speed integrated circuits and
314 very large-scale integration technology from Western
315 universities and commercial laboratories for both military

and commercial applications.

If we are successful in efforts over the next several years to improve our counterespionage activities in this country, we will deal with the large aggregate of Soviet success in acquiring technology in the country, and that, as I understand it, is a totally separate issue from the one you're addressing this morning. But from past practice, we can be certain that as those counterespionage activities become more effective in cutting off the most lucrative source for the Soviets, they will increasingly turn their attention to the remaining elements seeking more information, seeking to mine more information, which will ultimately be of at least some value in filling the short-falls.

Where do we think that pressure is going to come? Since the early 1970s, the Soviets and their surrogates among East Europeans have been increasingly using their national intelligence services to acquire Western civilian technologies--for example, energy, chemicals, and even consumer electronics.

Second, since the mid-1970s, Soviet and East European intelligence services have been emphasizing the collection of manufacturing-related technology in addition to weapon technology.

Third, and for this forum perhaps the most important,

since the late 1970s, there has been an increased emphasis by these hostile intelligence services on the acquisition of new Western technologies emerging from universities and research centers.

In reflecting on the large body of classified information, and on the functioning, sometimes reasonable well and sometimes not well, of the government's bureaucracy in dealing with the large outflow of knowledge, I began trying to project ahead toward that Soviet concentration which will come in greater degree on the information available from research centers and universities in the years ahead.

From my past experience, I was persuaded, and I remain persuaded, that if we can energize the academic and scientific communities to think about the problem, we have a reasonable prospect that they will come up with innovative ideas which will not close off that flow, but will substantially lower the risks they, as citizens of this country, share with the rest of us.

Why do I feel ideas can come that will help from the academic community? Because of experience in a related topic, the field of cryptology. The government became concerned about the public circulation of documents ON CRYPTOLOGY. The government's concern may well have been overdrawn, but it was nonetheless real. In the academic world there were many who were heard to say ''No restriction, no dialogue of any

type is possible without impairment of the basic rights of academic freedom.''

Some very thoughtful academicians who listened to the dialogue offered to play the role of honest broker, to provide a forum to discuss in detail the government's concerns and government proposals. Academicians were invited to join to present their ideas. There were a few who took the view that they couldn't offer any solutions unless they saw all the evidence of a potential damage to examine.

Fortunately, there were some very able and thoughtful members of the academic community who took a different view, who were prepared to stipulate that there were national security concerns, and to try to establish mechanisms by which one could attempt to accommodate the government's concerns without unacceptable damage to the basic tenants of academic freedom.

The American Council on Education provided the forum. The National Science Foundation underwrote the cost. The government came forth with a series of ideas and proposals, all of which were rejected by the forum. But the academicians themselves came forward with some schemes which, on balance, seemed to offer promise. They have been implemented. They need another 18 months OF USE ~~to work~~ before one has a reasonable base of knowledge on which to make

judgments. There is no direct relevance between the field of cryptology and the other technology outflows that we're concerned with now, and there is no certainty that the procedures which were developed for that specific model will have any relevance to the one out ahead. In fact, the chairman of the group, Chairman Mike Heyman, the Chancellor at Berkeley, has been quoted as saying he does not think they are directly applicable. I have come to have such admiration for his efforts ~~the last time~~ that I am prepared to accept his judgments. But I think the basic ~~tenant~~ TENET is still true.

It is time for the scientific community to accept that there is an outflow of TECHNOLOGY, that that outflow is potentially damaging, certainly to the national interest and, in specific cases, to the national security, and that they need not to wait for government regulations but to set up their own mechanisms now to determine what they believe they can usefully contribute in the way of ideas, in the way of procedures, to limit the outflow. None of us should have any idea, to put forth any suggestion, that we will totally stop ~~it~~ the OUTFLOW.

There will be a level of outflow that we will ultimately judge to be acceptable, but it is my judgment that the current outflow goes beyond that level, that we need to draw on the skill that the universities have already demonstrated

in limiting flow when they wish to patent the results, and limiting flow when they are working for industry, to also find ways in which they can make suggestions that will impede the flow to the Soviets of useful technology coming out of their own research efforts.

Ideas from the academic world will not do the job alone. The government will also have to come up with new, responsive mechanisms to quickly respond to the scientists when they ask will unfettered publication of research in this new area have any potential for military application in hostile areas. And if the government is not prepared to rapidly respond and to explain why, then there would be little likelihood of the efforts on the part of the scientists ever going very far.

Let me stop at that point, Mr. Chairman, and turn the floor over to my colleagues, and then I will be prepared to answer questions.

Mr. WALGREN. Thank you, Admiral Inman.

Let's turn next to Mr. Brady. Welcome to the committee, and the same introduction applies. Written statements will be made a part of the record and please proceed as you feel you would like.

STATEMENT OF SECRETARY BRADY

Secretary BRADY. Chairman Walgren, Chairman Gore, I have a very short statement. I think it might be useful for the discussion that I go through it.

First let me say that we appreciate the opportunity to exchange views on what we believe in the Administration is a very complex matter that we have to deal with. In addressing this topic, I will describe the issues, including the applications of our current controls and the general manner in which we are proceeding to address these issues.

Among the transfer of technology issues of concern to this Administration is how and when to prevent or delay the dissemination of sensitive, dual-use technology for national security reasons without unduly burdening creative scientific research or exceeding legal limits. The complexity of this problem stems from trying to assure the proper balance between vital national security interests and the valuable process of scientific exchange.

During the enactment of the Export Administration Act of 1979, the House recognized this complexity. The Foreign Affairs Committee report stated that controlling the transfer of technology through scientific exchange is ''difficult, if not impossible.''

The Export Administration Act provides the statutory authority for controlling the export of U.S. technology for national security purposes. The Act, like its predecessors, requires that export controls be used where necessary, ''...to restrict the export of goods and technology which would make a significant contribution to the military potential of any other country or combination of countries which would prove detrimental to the national security of the United States.''

Regulations implementing this statutory mandate have been in effect since 1955. They serve an important public purpose and the Department has a statutory duty to enforce them.

Since these controls on transfers of technology are not new, why has this issue generated so much activity in recent months? I believe there are several factors that have contributed to the expression of concern by the scientific community. First, in the past, it has not been clearly understood that our technical data regulations apply equally to all segments of society--to industry, to individuals, and

to academia. Moreover, as academic institutions have become increasingly involved in research for industrial applications, more technology becomes potentially subject to the regulations. Thus, as a consequence of academic involvement in research for industrial applications, we have become more aware of the impact on the national security of such transfers and have become more vigilant in enforcing the regulations.

The scientific community is concerned that the Administration's efforts to stem the transfer of sensitive technology to potential adversaries will stifle scientific exchange to the detriment of U.S. scientific development and will impose unworkable constraints on day-to-day activities in universities.

We are not unmindful of the concerns of the scientific community, as some have suggested. Indeed, the current effort to modify our technical data regulations was prompted by the concerns of the academic community. As we try to reach a delicate balance of protecting national security withut unduly impinging on scientific endeavor, we will continue to work closely with the scientific community.

I would like to describe for the members of the subcommittees how these regulations are applied currently. The Department does not control the export of technology that is already generally available to the public.

Moreover, it does not restrict any nonpublic dissemination of scientific or educational data that is not ''directly and significantly related to...industrial processes.''

We focus on preventing the transfer of scientific research involving nonpublic data that is related to industrial processes and could endanger U.S. security. The Department consults with the intelligence and defense agencies in determining whether our national security could be endangered by proposed scientific exchanges. In cases where there is a national security concern, we would work with the scientists or institutions to preclude release of critical technology.

The application of export controls to scientific exchanges is illustrated by an incident that occurred under the previous Administration. In February of 1980, a conference on advanced computer memory technology was to be attended by representatives from the USSR, Eastern Europe, and the Peoples Republic of China. U.S. sponsors of and participants at the conference included both industry researchers and university faculty. Since the technology to be discussed at this conference included data which was not publicly available, but was related to industrial processes, nationals of proscribed countries could not participate. The sponsors restructured the conference so that the information presented would either be publicly available, or

would only address general technology trends and not manufacturing processes.

I might add, Mr. Chairman, that at that point representatives from the USSR and Eastern Europe did not attend the conference.

As academic institutions are becoming increasingly involved in research with industrial applications, this Department needs to clarify the technical data regulations to provide more specific guidance as to whom and under what conditions transfers of technology are controlled. This is not a simple process. We are consulting with other concerned agencies, such as the CIA, Defense, State, Justice and the National Science Foundation. At the same time we are attempting to involve the academic and industrial research communities in developing a workable set of regulations. We are also exploring ways that these communities can provide advice to the Department on a continuing basis.

This is unquestionably a sensitive and complex problem. We are striving to restrict the transfers of technology that impair our national security, while not unduly burdening scientific research. This is vital to fostering the technological breakthroughs we need in order to become more productive in today's highly competitive technology market.

Thank you, Mr. Chairman.

Mr. WALGREN. Thank you, Mr. Brady.

We will turn then to Dr. Millburn.

STATEMENT OF DR. MILLBURN

Dr. MILLBURN. Mr. Walgren, Mr. Gore, members of the committee: I am pleased to have this opportunity to testify before you on the impact of national security considerations on science and technology. With me are Dr. Leo Young, Director of Research and Technical Information in my office, and Dr. Frank Kappeur, Director of Military Technology Sharing in the Office of International Programs and Technology.

I have already submitted written testimony for the record, and I would like now to just make this very brief statement.

We are currently looking into the whole process of technology export controls as they affect our national research endeavor in general, and our universities in particular. We have instituted dialogues with the universities, with educational and research associations, and with professional technical societies, and are about to fund a study of the problem by the National Academy of Sciences. We are doing all these things both to guide our actions more wisely and to enlist the wholehearted support of the research community.

Over the years there has been a shift in emphasis from product control to control of technology, as such. This shift has complicated DOD's relationships with the universities since a considerable amount of relevant, high-technology knowhow exists, not only in those industrial firms where the knowhow is applied, but also in the universities. A basic tension, therefore, exists between the requirements of national defense and the need for universities to remain relatively free in their pursuit and dissemination of knowledge.

Industry is driven by goals and motivations quite different from those found in the university, and proprietary restraints act to inhibit the flow of the really important knowhow. In academia, on the other hand, prestige and recognition are attained by being the first to publish a new idea or concept. It is, therefore, crucial that the Department of Defense be sensitive to these differences in its pursuit of the control of the export of technologies that are critical in a military sense.

The situation is being complicated by, first, the changing nature of military technology. Military power is now highly dependent on advanced commercial technology.

Second, the changing interests of university researchers. Universities have entered a new era in which applied research--for example, in genetic engineering--is receiving

pronounced attention.

Third, the emerging concept of militarily critical technology. The Department of Defense has spent a great deal of time and effort defining what technologies or know-how would substantially benefit potential adversaries.

Except for a few academic consultants to the Department, the academic community has little knowledge or appreciation of the struggle within DOD to better define what technical information is important militarily and should be subject to some form of review and ultimately of control.

We are caught in a dilemma. If we vigorously attempt to regulate the flow of scientific information in the scientific community, it could jeopardize the strength and vitality of the very community we are seeking to revitalize for the sake of national defense. On the other hand, if we abandon any attempt at regulation in the university context, it could seriously compromise and undercut over efforts to control the outflow of militarily-critical technology.

Nonetheless, there is reason for some optimism. We have attempted to at least lay a framework for solving the issue by means both practical and, it is hoped, acceptable to the academic community. A dialogue with the universities has already begun over the transfer of non-classified but nonetheless sensitive information in the Very High Speed Integrated Circuit Program.

The problem of controlling the flow of sensitive information may not be as difficult as first perceived. The situation is similar to that of proprietary information developed in the course of industrially-funded university research. A corporation supporting university research is not concerned when a professor teaches basic science in engineering in the classroom. If, however, in the course of his research under corporate contract the professor made public information would could, in essence, benefit a competitor, there would be cause for alarm. The information which could help a competitor is, in general, manufacturing or process knowhow, not basic science and technology.

The focus of DOD attention for the near future will be toward establishing clear and consistent guidelines for the release of information in DOD-university contracts. An outline of some considerations is given in the written testimony which I have already submitted.

Toward this end, we have already met with and started an exchange of views with non-DOD organizations involved in research. Following a recommendation of the Defense Science Board, a DOD-university forum has been set up. It consists of eight university presidents, the heads of three university and higher education organizations, and nine members representing the Department of Defense. The first meeting was held on February 24th.

This forum will consider several areas of mutual concern. The first meeting dealt mainly with the question of export control. A working group to further define and understand this problem is now being set up with the help of the Association of American Universities.

We are also commissioning a study to be performed by the National Research Council on the broader question of the effects of export control on the publication and dissemination of technology.

In conclusion, we are tackling a serious and difficult problem that has been ignored for too long, and we are tackling it in a responsible way. We do not want to kill the goose that lays the golden eggs. We just don't want the eggs to fall into the wrong hands. I believe we are all agreed on that.

[The statement of Dr. Millburn follows:]

********** INSERT 1-**********

676 Mr. WALGREN. Thank you, Dr. Millburn.

677 The Chair would recognize Mr. Gore.

678 Mr. GORE. Thank you very much, Mr. Chairman.

679 Admiral Inman, this subject is one that is very difficult
680 to treat, as I'm sure you probably know at this point as
681 well as anyone. The purpose of these hearings is not to say
682 to you and others at the witness table that there is no
683 balance and there is no legitimate concern being expressed,
684 but rather to elevate the degree of consideration given to
685 academic freedom and to make you more keenly aware of the
686 importance the American people place on protecting academic
687 freedom.

688 When I hear you say that you want to serve as a goad to
689 discussion, I can understand that. And when you say you
690 want to energize the academic community to take these
691 concerns seriously, I can understand that. When you say you
692 want them not to wait for the government to act, then I
693 think you begin to cross a line that may not exist. I think
694 to tell the--Well, let me rephrase that. You begin to cross
695 a line that the government should approach very, very
696 cautiously.

697 You don't want to engender the fear in the academic
698 community that the government will, in fact, impose some
699 burdensome censorship if they do not take the suggestions
700 you offer as a goad, and as two subcommittees of the

Congress, I believe that we reflect the views of the American people that yes, this is a problem that requires a balanced and sensitive approach, but no, we don't want to even take the first step along the road that has made Soviet science so pitiful, which is essentially the censorship and restriction that has inhibited their--

Admiral INMAN. I really just must reject the last phase as being applicable in this case. The question of determining how one restricts flow, that to take that on you somehow are going to create a science and technology world like the one of the Soviet's, I think is just not a fair comparison to which any reasonable interpretation of my remarks would lead you.

In the interest of goading the Congress as well as the public, let me turn to Chairman Walgren's opening remarks, which convey to this listener a sense that anything related to an exchange is good and anything which would impinge on that exchange is not good. I think you have a responsibility now to look at the question of what benefits have accrued to the U.S. from the exchanges of the last 13 or 14 years? Have we, as a society, measureable benefits from our exchange with the Soviets across the whole range that would cause us to say a continued outflow to help build up their technology is worth doing? If there's a case there, then you probably could alter my attitude. ~~bring me back to persuade it.~~

But I am no longer prepared to accept, as a given, that the U.S. benefits from that exchange to the degree that we should not, in fact, consider ways to impede that flow.

Mr. GORE. Well, let me continue my questioning.

First, in reaction to that, I don't think that the national security apparatus of the government can shift the burden of proof to the academic community and require them to justify continued freedom. It may be--

Admiral INMAN. Again, Mr. Gore, I don't think you can characterize ~~it as~~ "continued freedom" as the question that we're talking about. We have innumerable ways in this society in which we work with constraints, but that does not give up freedom. It controls the degree to which one parcels it out. My enormous distress with earlier coverage by the press, as with this, is to cast it in black-and-white issues ~~of~~ that freedom is at risk on one side as opposed to some nebulous kind of concerns about Soviet gains on the other. I think that unfairly casts, for those of us who are in the process of watching the Soviet events, how one might advise the government to react to it.

Mr. GORE. Well, I know you to be a very sensitive analyst and capable of very subtle thought, and I want my reaction to your proposal to be fair and balanced and not an overreaction.

Nevertheless, in discussing the absolute principles and values that conflict one with the other in this arena, it is impossible to avoid stating one's concerns without occasional reference to the absolute value one is seeking to protect. And in the case of freedom of information and academic freedom, there is a point when even halting tentative steps in a direction that leads into conflict with that absolute value must be described in those terms, and for us to say to you, ''Wait a minute, it looks like you're taking the first steps in a direction that could lead us into some real trouble down the road.''

Now, you felt like there was an overreaction to your suggestions. I feel like your last comment was an over-reaction to my response.

Admiral INMAN. It may well be, Mr. Gore. Just as I have reflected back on my comments before the AAAS, I have only one part I would have changed, and that was the use of the phrase ''tidal wave''. I don't expect a tidal wave as I reflect on it. I expect some pretty choppy waters, however, before we--

Mr. GORE. Well, I think you're on an isthmus and there's

a tidal wave that could come from either direction.

[Laughter.]

Admiral INMAN. Let me ask you a direct question, sir, if I may.

Mr. GORE. Well, that's not the normal procedure, Admiral Inman, but out of my great personal respect for you, I will waive the normal procedure and invite you to proceed, however.

Admiral INMAN. I'm grateful.

The point really is, would my concerns that I express as a knowledgeable, personal viewpoint, have the same concerns if I spoke them as a private citizen, out of office, as they do when I come forward as the Deputy Director of Central Intelligence. Because this is a topic on which I feel so strongly, that the country needs to pay attention ~~of it~~ and needs to be concerned, that I have to make some decisions about how one can ultimately contribute best.

If whenever I raise the concerns I'm going to find it treated, at least in the media, as somehow the intelligence agency is ~~somehow~~ trying to throw a net over the public, then I can't usefully contribute to the dialogue.

Mr. GORE. I think the answer to your question is quite clearly yes. There is a changed perception of your remarks because you are in the position that you hold, and because they come at a time when the new administration has taken

other steps which, to some observers, make up a pattern that is troubling to them.

Let me ask just two final questions lest I encroach on my colleagues time.

First, I guess more than a question, less than a question, is simply a statement that I referred to during your opening remarks. I have carefully reviewed the evidence, and I asked the intelligence community, both at your shop and elsewhere, to describe in detail what is it that has come from the academic community, from the research community, that has given rise to this degree of concern.

Now, I am perfectly prepared to believe that it is difficult to gather such evidence, and that it is difficult to present it in a way that engenders in others the concern that you feel. But I have not been convinced that the degree of leakage or hemorrhaging, or whatever word you want to use, from the academic community is such that it would override the concerns about taking even halting steps under the goading of someone in a government national security position post.

I wonder if you want to address that.

Admiral INMAN. Mr. Chairman, the study which will come forward to you, which you will include in the record, does at least have some specifics in a couple of areas. We have broken out some hard data on the targets, on the particular

areas in which we know the Soviets are concentrating their efforts and will concentrate them in the months and years ahead.

A good deal of the basic work in these areas is being done on campuses, in research centers. Not in all campuses, ~~Some of it are~~ only those where they have agreed to work specifically with the Department of Defense or other entities.

You will recall in my remarks that I focused at this point in time that I believe the actual outflow of value to the Soviets from the academic sector is a very small portion of the overall problem.

Mr. GORE. Yes.

Admiral INMAN. If we are increasingly successful in the counter-espionage activities against the large leakage, I think the academic community is likely to find themselves a substantially greater target than they are now. I believe these areas will help to some substantial degree refine at least where the first interest ought to be placed.

Mr. GORE. Very good. One final question now.

In order to put your concerns and your statement in the proper context, is it fair to summarize what you're saying as follows, or what you would like to be perceived as saying, that as a private citizen, who happens to have familiarity with the flow of information and technology to

the Eastern Bloc, you would like to see greater sensitivity within the academic and scientific community in this country, and some thought given to that concern on their part, but that neither as a private citizen nor as a responsible official in the national security apparatus, the CIA, are you contemplating or preparing any sort of follow-on initiative by the government to attempt to enforce such activity in the academic community if they do not, on their own, recognize such an obligation?

Admiral INMAN. That's a fair and articulate capsulization of my views. It is precisely the latter part of that, based on knowledge of Soviet successes, that led me to ~~I have begun to~~ worry about or what other branches of the government might ultimately propose in the way of regulation.

The intelligence community will have essentially no role in writing the regulations. We will put forth what we see as the danger, as the leakage. Any regulations which will come will come from other parts of the Executive Branch.

Mr. GORE. Well--

Admiral INMAN. And in consultation with the Congress.

Mr. GORE. I was giving you a chance to allay my concern, but--

Admiral INMAN. I really didn't intend to allay your concern, nor that of the scientists. In this case I'm saying that I think six months, a year, 18 months down the

road, as the full magnitude of the Soviet's success of acquiring technology in the West comes to the front of the agenda to be considered by the government, and the government decides how to react, at that point I believe there will be proposals to try to regulate it.

Mr. GORE. Are you talking about Mr. Brady?

Admiral INMAN. I think it may come from a combination of Commerce, Defense, State, the entire national security apparatus. And at that point in time it would be very helpful if the academic world had given some very serious consideration themselves to both the depths of the problems and suggestions on how to deal with it.

I may be wrong. The country may decide not to deal with the problem at all and let the outflow continue. I think it is more likely that we will ultimately come as a government to decide to take some further efforts against that outflow.

Mr. GORE. I will have to pursue this at another time. I think you ended up--maybe not you personally, but you ended up placing the government on the other side of that line, because I don't think that threat is one--and I don't mean to characterize what you said as a threat--but the threat that you perceive, that you say you perceive, I don't think that that's going to be--

Admiral INMAN. I should not endeavor to speak for my colleagues. They're the ones who will come to the role

ultimately of where they believe some further measures to impede the hemorrhaging are necessary.

Mr. GORE. Thank you, Admiral.

Mr. WALGREN. Thank you, Mr. Gore.

The Chair recognizes Congressman Brown.

Mr. BROWN. Gentlemen, I appreciate the statements you have made this morning. Obviously, this is a very sensitive area in which we have over a number of years been trying to achieve a delicate balance, and that is always something that is subject to change. I don't think it is unusual to expect that this administration would want to review that balance when it comes in, nor should it be surprising that those who are disturbed by that effort sometimes engage in some fairly strong rhetoric about the fears that they have with regard to disturbing that balance.

I have a concern about the balance in many ways, but I hope that I can give you credit for seeking a rational effort to establish a better balance rather than to destroy the foundations of American freedom or whatever it is you may be accused of doing.

In order to improve the results of this hearing, I would be grateful, Admiral Inman, if you could provide the committee, as you have indicated you would, with that list of technologies which you feel have leaked to the USSR, and I would suggest, if you don't mind, that you do your best to

enhance the classified version, which I gather is in the hands of the Select Committee on Intelligence, that some of us might want to look at both in order to determine just what the situation is.

This leads us to my next question. Basically, that question is, who makes the decisions as to whether this drain of technology is a serious threat to American security or damaging to the American national interest, which is a term that you used. I am sure it is no secret to you that Congressmen are notoriously different and we have them spaning the entire range of views, and we all have deep respect for each other, but very rarely do we depend upon another Congressman to make our views for us.

Now, the question is, should we turn over to you, or to somebody in the administration, the prerogative of establishing what our views will be on what is the national interest, or even what is national security.

I would like to have you elaborate on how you think the Congress should properly be involved in making these rather fundamental decisions of policy with regard to what constitutes the national interest and the national security.

Admiral INMAN. If the process works as I think it should, Congressman Brown, we will eventually reach the point where the administration examines the current mechanisms by which one manages the flow of technology from the country, the.

international transfer and arms regulations of the State Department, export controls as they apply, and the Defense Department role as well.

The Congress has a number of avenues available to it to influence that discussion, even in the Executive Branch, as it is ongoing, probably no way more forcefully as you demonstrate so often in the appropriations and authorization process for the various departments.

My own perception is that ultimately we will reach the point of legislation that deals with how this mechanism interrelates among the departments, that there will be a review of the state of the legislation. It may be that that review will, in fact, not ever really address the part that I'm ~~at~~ talking about here, that we will ultimately reach the decision that we will put our efforts on the 70 percent rough estimate of an outflow based directly on military technology and not on the underlying independent science and research. If that's the case, then we will not end up--unless Congress takes the initiative--in addressing that final sector.

But I believe the process will work to the point that you will have serious proposals to consider a year or year-and-a-half down the way. Whether you should wait for that, or whether you should start your own initiatives, I think I would probably not be brazen enough to suggest to you at this point in time. Though I do think the flow of

information, getting people to seriously address the problems, and starting ~~that we somehow need to get~~ a debate--not a debate, but a discussion--on what values have accrued to the U.S. through the exchanges. I know of some values. I know simply in the process of ultimately being able to hire analysts in the intelligence community who understand Eastern Europe, that some benefit accrues under the IREX ~~THIS~~ process, of students who ~~go and~~ study there for some extended length of time.

In my own personal approach to the problem, I would rather not lose that as part of the overall effort, but I think we do need to get the debate off of the flash words of either a tidal wave on one side or academic freedom on the other, and understand the benefits back and forth. I think Congress does have the potential for helping move that along faster than the administration otherwise is likely to do so.

Mr. BROWN. Well, you're going to have a problem, as we in Congress have found many times, in outliving your statement about the tidal wave. I see the April issue of Technology Review again quotes your statement, in which you say--this is the one you made in January, I guess--that it is thoroughly documented that the bulk of the new technology that the Soviets have employed in their military build up has been acquired from the United States, which you describe as a hemorrhaging of this country's technology and you anticipate

a tidal wave of public outrage.

Admiral INMAN. The only part of that that is left for question is whether or not the tidal wave is going to come. The other is documentable fact.

Mr. BROWN. Well, I have asked you to proceed with that documentation, as you have indicated you would.

Let me ask Mr. Brady if you recognize this statement. It says here that ''While technical data of conceivable adverse significance to U.S. national security and foreign policy are, on occasion, publicly available, the impact of their availability on the U.S. national security or foreign policy is likely to be minor.'' And then it goes on to explain the reasons for this. This is a 1977 report of the Department of Commerce.

I presume you don't agree with it, and I wouldn't necessarily expect you to, but I would suggest that you read it so you can thoroughly understand why you differ from the conclusion made by--

Secretary BRADY. Mr. Brown, let me make a couple of points.

One, in the five years--I believe that's a 1977 report--

Mr. BROWN. Right.

Secretary BRADY. --in those five years, there has been a tremendous amount of information developed in the Executive Branch, certainly in the intelligence agencies, and this

process began, as a matter of fact, under Dr. Brzezinski in the last year or so of his tenture at the National Security Council.

Secondly, I don't think it's a secret to some of the members of the subcommittee that in 1978 and '79, as I was deputy director of the office that submitted that report, I differed in substantial terms before the House Armed Services Committee about some of the statements that were being made by representatives of the Executive Branch to the Congress. So I would have absolutely no problem in disagreeing with those conclusions. I think in point of fact, however, that the basis of what we learned in those five years is significant.

Just one last comment. A question was raised as to why the academic and scientific community and what real impact does it have on the transfer and how important is that impact. I would only make the point that what we have learned in the last few years is that the acquisition of technology by the Soviets as a well-coordinated, integrated entire approach. In other words, they buy what they can; what they can't get, they'll steal. And if they have problems meshing the two, then they get the information through a different way. That's why the exchanges are important and that's why the student exchanges are important.

So each and every part may have little relevance to the whole, but as the whole, it is tremendously important.

Mr. BROWN. Mr. Brady, I would appreciate it if you would expand in writing later on your reasons for the change in conclusions. But I would point out that what you have described is exactly what China, Japan, and most other countries do who face a competitive disadvantage in technology with the U.S. They proceed to acquire it as quickly as possible, through every means available, and that includes exchanges of all sorts, occasional industrial espionage or whatever they need to do. I understand that some of our closest allies like France and Canada may do the same thing. For you to imply that there is something unusual about a country like Russia doing it I think is erroneous.

One additional thing that I would very much like to have all three of you gentlemen do for the record. I am sure you know that after your testimony we have some distinguished witnesses who will present other and possibly even different points of view from yours. I would appreciate it if in due course you could review their testimony and comment on it for the record so that we might have a rebuttal process and enlarge the dialogue to that extent.

Would that be agreeable? I think it would be very helpful to us.

Secretary BRADY. We would be pleased to.

Mr. BROWN. Now, let me ask one additional question, if I have some time to do so.

Admiral Inman, in suggesting areas of technology which you thought might require some additional controls--you mentioned several and I'm going to ask you about one. But you have also, I think, made the point that there are areas of technology in which the item itself may not be sensitive or related to the national defense, but it leads to other areas which might be.

I wanted to ask you specifically, since you mentioned agricultural crop forecasting, whether our concern is with the Russians having information about our projections of global production for the forthcoming year, or whether you are mainly concerned about the Earth resource observation technologies which lead to our ability to do that.

Admiral INMAN. The concern, Mr. Brown, lays with evidence of Soviet manipulation of the market, and of concern that the availability of crop projections facilitated that. One may end up accepting that this is an area that we simply cannot deal with, but what I was trying to get across in those remarks is the breadth of information which they scoop up and put to use. And it was in the manipulation of the market.

Mr. BROWN. I think that is a very legitimate concern. I

think it is obvious that the Russians have manipulated the market, to our great disadvantage, and we need to do something about it. But I honestly believe that you would have been doing your own cause a greater service if you had elaborated on that aspect of it instead of just making a statement that we ought to put restrictions on the availability of good crop forecasting. There is nothing the American farmers need more than good global crop forecasting.

Admiral INMAN. Again, Mr. Brown, I hope you will read the Science News coverage, which I put in, which is vastly different than the bulk of the rest of the coverage.

Mr. BROWN. But, you see, this illustrates a particular policy point. The fact is that we do need to do something about the Russian's capabilities to manipulate our markets, or any other centrally-dominated state, and as a matter of fact, some of our allies do that, also, where they can.

The real policy question is how does the United States respond to that; by concealing information or by taking policy steps necessary to redress that. What I'm interested in is the process by which the Congress can act intelligently to take that action most helpful to the public welfare of this country.

It is my opinion that when you move the balance too far one way toward concealing information, or restricting the

flow of information--I don't want to use a pejorative term--that you may inhibit the capability to make the sound policy decisions necessary to react adequately in the situation.

Would you care to comment on that?

Admiral INMAN. There is clearly a balance to be struck. We tried with Congress to establish in this last half of the Seventies a mechanism which will make it possible for you to see classified information which guides the administration in its deliberations, by the creation of two select committees, by depositing information there, by having it available to all the Members to review. I realize that has not proven satisfactory to many simply because of the pressures of time and since they can't rely on staffs to do it as they do otherwise. I frankly don't have a better idea at this point in time on how to make available the classified information.

I don't think declassifying the evidence, on balance, is the right way to go, because in an open society it is extraordinarily difficult to classify information. But in a closed society, they find it very easy to do, and they find it very easy to pin down how we are discovering what they are doing and to go cut off the faucets.

Mr. BROWN. Admiral, I am sure you know that you and I have some differences with regard to the classification of information, and I won't belabor those, but I do want to

raise again the question of how you resolve them, who makes the policy decisions.

Do you think the Congress has a role in that?

Admiral INMAN. We operate now in some of these areas, Mr. Brown, under Executive Order. We operate under those in things like the organization of the intelligence community, because several administrations have ultimately decided they did not want laws, and the Congress has proven reluctant to pass laws.

It will be no great surprise to some members here that I lobbied hard for legislation on the intelligence community, to structure how it would be organized, how it would be run. But as perhaps with this lance that I'm carrying in this current situation, there was not an appetite to undertake that in either the Legislative or Executive Branches.

If Inman, as a private citizen, may express his view, I think getting on to legislation as opposed to Executive Orders is, over the long balance, a preferred approach.

Mr. BROWN. Well, the intelligence area is not the only area in which most administrations take the view that they prefer not to have Congress meddling in their business. Ultimately, as you say, we have tools with which to redress those attitudes, but whether we use them or not is--

Admiral INMAN. They tend to be rather effective when you use them.

Mr. BROWN. Yes.

Thank you, Mr. Chairman.

Mr. GORE. [Presiding.] Mr. Walgren.

Mr. WALGREN. Thank you, Mr. Chairman.

I would like to explore the hemorrhage, if we could, Admiral. Would I be right in concluding that in the hemorrhage you're breaking this down into various categories of information transfer, 70 percent being sort of government-to-government or Defense Department to Defense Department, strictly military, the kinds of things that we have already focused our attempts to restrict information transfer, with apparently at least not enough success to withhold the 70 percent that they have received there.

And then you have a 30 percent range, where there is some benefit of transfer, a very small percentage of which is research and university related, if I heard your testimony correctly.

Admiral INMAN. That's not quite what I was trying to convey, but I don't have any basic disagreement with the ultimate conclusion you get to.

Mr. WALGREN. What I'm sort of trying to lead to is your agreement that there has not been significant harm in this area yet.

Admiral INMAN. There has been some harm, and there are even some examples where it's significant. It is not,

relatively speaking, compared to the other losses, a large part of the problem. It is clearly the area we have been very slow in addressing, the counterespionage side, and that largely has to do with resources applied to the problem, resources available to the FBI.

Mr. WALGREN. You wouldn't use the word hemorrhage to describe that sort of transfer.

Admiral INMAN. I would use hemmorrhage as to the outflow of what the Soviets have acquired, and by a wide range of means. Overwhelmingly, the most successful of those means has been the espionage efforts, but some of that has been totally open. We are such an open society that they can get huge volumes of data and then very specifically target for the pieces which are the immediate payoff.

Mr. WALGREN. But in response to Mr. Brown's asking for documentation of the word ''hemorrhage'', you're really focusing on the whole range of the transfer, 70 percent being in these areas we have attempted to control in the past--

Admiral INMAN. Precisely.

Mr. WALGREN. --and a very small percentage, even of the remaining 30 percent, being in the area of university and basic science research.

Admiral INMAN. That's correct. And I am also leaving, Mr. Walgren, in the hopes that we are going to be more

successful as a government and with our allies, in stemming the high technology, the direct application, where they get the design of a warhead system or the design of a missle guidance system, and that as we are successful in closing those, we know from other areas the attention then will increasingly go to the areas that are uncovered. What does one do then?

Mr. WALGREN. Just to make the point again that the losses in this area, in your view, are not yet significant--that is how you described those losses in the submission for the record that you made from the Science Service publication. You said, ''I believe it is necessary before significant harm does occur.'' I would take from that, at this point anyway, in that area you do not see significant harm as having occurred. So whatever the hemorrhage is that you're going to document for Mr. Brown is probably going to come by and large in that other range, certainly at this point.

Admiral INMAN. The point I tried to make in response to Chairman Gore earlier, Mr. Walgren, was that we know where they're focusing their interest. We know the problems that are out ahead. ~~The hemorrhage has not yet occurred.~~ The effort here is to focus attention on that area and see what can one do to impede it.

You will never control it without unacceptable damage to the USA, so you're not talking about how you get a hundred

percent shutoff.

Mr. WALGREN. I wanted to just ask a little bit about the premise that, as they are cut off--and apparently you're assuming that you will be more and more effective with respect to the area that the hemorrhage has already occurred--

Admiral INMAN. Hopefully.

Mr. WALGREN. --assuming you're more effective in that area, as they are cut off, they will apparently divert their attention to this smaller portion of our concerns.

That really implies that they have not directed very much or focused much attention in those areas as of yet, if our fear is a future fear, and that it will come because of the efforts that you and the success you have in the area of direct military; then that implies they have not really been focused on the basic research and the manufacturing and the university research, at least until this time.

Is that--

Admiral INMAN. You will note in the Science News reporting of my statements at the time that I believe the primary problem at this point was in applied sciences, and that there had been very little impact on the basic research. I saw then ~~It was~~ that it was in ~~the~~ applied research where the overwhelming percentage of benefit had been obtained by the Soviets.

Mr. WALGREN. But I get from your testimony that nothing significant has happened thus far, or at least that's the exact word you used, and you anticipate a greater shifting of focus on to the universities and the basic research.

Then my question is, is it really true that they have not focused their attention on the universities and the basic research areas of our society in the past?

Admiral INMAN. The heart of the evidence available to us would show that they have screened information across the whole range, anything that's available relating to present and future U.S. progress in science and technology. But the heart of the efforts have been on applications, things that they can use in the very near term to get into production, cutting short substantially the amount of time necessary to get into production of systems.

Mr. WALGREN. With respect to application and the general approach to what we retain--and I gather we're talking here mostly about manufacturing processes, the applied side of it--would you excuse the non-applied side from great apprehension that there's going to be a transfer that would justify draconian measures that might chill the flow of information--

Admiral INMAN. I have never presumed that draconian measures against the basic research side were either warranted or likely to occur.

Mr. WALGREN. Is it true, too, that when a manufacturing method becomes generally available in the world, if it can be procured from Italy and France and other areas, then we would no longer have a true interest in preventing discussion of that?

Admiral INMAN. We will certainly have lost the ability to control the transfer. It is the advent of multi-national corporations, the advent of great growth in research and development activities in Western Europe and Japan, that makes this a very complex problem to deal with. It is by no means a technology loss only from the U.S. It is from all across the West.

I think if you will look at the registration of patents in this country, as I understand it, an increasing percentage of the applications in recent years has come from foreign subsidiaries.

Secretary BRADY. Mr. Walgren, may I insert a note?

You mentioned that when it becomes available in France or Italy or whatever, that we cease to achieve an element of control. That is not entirely accurate because that's why the COCOM system, the multilateral system of controls, exist. That's why we maintain them with our NATO allies in Japan. We do, and I think we have achieved, to the extent we're willing to be firm about it, a degree of control to our potential adversaries of the kind of technology and

equipment that would be available in other countries.

This administration has embarked, as a result of the President's commitment in Ottawa, on redesigning that system of multilateral controls.

Mr. WALGREN. We speak of some kind of gathering government initiative in this area 18 months down the road and the like. What is the degree of coordination and development of that response? Can we be satisfied that the proper people in the administration are, in fact, talking to each other on a ongoing basis so that we know the perspectives from various concerns will be incorporated and considered in the drawing up of whatever is coming in 18 months?

Dr. MILLBURN. Of course, the responsibility ultimately for the order will not rest with the Department of Defense, but we have submitted our inputs with respect to how we think the classification procedure should be.

Admiral INMAN. I think this goes far beyond just the classification procedures. It really gets to the whole question of how one looks at and coordinates outflow of technology and whether the current mechanisms are working well, if I understood Mr. Walgren's question.

Secretary BRADY. Mr. Walgren, there is no question but that there is an extensive inter-agency system that I think at this point works fairly well in meshing the views and the

information available from me to the agencies so that the final result that is agreed to, either at the Cabinet level or by the President himself, reflects a good consensus of, one, what should be controlled, and the best means to achieve that control.

Mr. WALGREN. Well, let's look at that, then, in one specific case that is. As far as I know, sort of the greatest focus of our efforts in that area, when the President has now apparently decided to withdraw from IIASA.

Was that decision the result of this coordinated and good judgment, well-founded decision with input from all these various agencies that are working on this proposal?

Admiral INMAN. None of us are your expert witness for that decision. Each of us probably had an input in a way on the intelligence community side. We documented the use of the mechanism in some specific espionage activities. A case in Norway comes specifically to mind.

Mr. WALGREN. Just for my own purposes, because I have sat on a committee that looked at that, or has some dealing with that, as I understand it, the CIA's concern with IIASA was limited to the fact that somebody associated with the organization used it as a cover, just like somebody associated with any activity like a university might use it for a cover, to contact somebody in the West and talk about some work that was not related to IIASA.

Is that the CIA's reservation, that it was used as a cover and, if so, how can that justify withdrawing from an organization because there are multiple covers out there?

Admiral INMAN. Mr. Chairman, first, there were more concerns than just cover. But again, let me underline ~~my~~

That was an input. It is my understanding that wasn't the determining factor at all in the decision not to proceed. Again, I am talking to you from ~~sort of~~ secondhand knowledge.

But my understanding is it was a combination of the National Science Foundation's budgetary constraints, the question of whether the use of funds in IIASA were, in fact, an efficient use of the limited funds that were still going to be available, that the work had not been of the quality ~~of~~ or value to merit further expenditure of the funds, and the lack of Soviet reciprosity, where they didn't provide access to a single Soviet data base, whereas the Soviets got access to a wide range of Western data bases, these all were factors that have impacted on the decision which has been made.

I can only report those. I can't speak with direct knowledge on any of them.

Mr. WALGREN. I have used the other members' time and I apologize.

You know, I am the first one to try to take a cautious approach towards national security. What concerns me is that there apparently is a psychology out there that I was apprehensive that your goading in that direction was reflective of, and that psychology is to be extremely apprehensive about what might happen in this area. I

believe we have to be apprehensive, but then when that becomes a justification for actions which, if we truly look at them on their merits, it does not justify, I'm afraid it really cuts off our nose to spite our face.

I just want to say that I appreciate your underlining your role as simply pointing a direction or goading, which implies driving farther than may be necessary in order that people think about this, to differentiate that from the reality of actual policy decisions. But I am very much afraid that others in the government will be driven by that fear and take actions which are not in our best national interest because of it.

I realize it's a very difficult area and one where clear lines cannot be drawn. But I appreciate your coming into the committee and your response.

Thank you, Mr. Chairman.

Mr. GORE. I take it that you share that last concern as well, if I understand your testimony.

The chair will continue to recognize my colleagues in the order in which they arrived, according to the rules.

Mr. Shamansky.

Mr. SHAMANSKY. Thank you, Mr. Chairman, Admiral, and the other gentlemen on the panel.

In 1960 I traveled to the Soviet Union as a tourist, and in the Metropol Hotel in Moscow I asked the Intourist Office

if I could have a map of the underground. They said they only had one in French. I said I could handle that, so they gave me one. An Englishman right after me asked for one, and they said they didn't have any, suddenly.

It was a vivid illustration for me, that in any kind of society in which there is a premium on not taking responsibility for making a mistake--and the Soviet Union, it seems to me, is a classic example of that kind of society--it is always better to say no. Then you can't be blamed.

Now, with respect to the ability of the administration to make important decisions, we, on this committee, have tried at least to get rid of the Clinch River breeder reactor at about a quarter of a billion dollars a year, but the administration, in its infinite wisdom, keeps putting it back, even though Mr. Stockman said in 1977 we shouldn't have it at all.

I bring that up to say a faith in the ability of any administration to make great decisions is a little worrisome to at least this member, who is in real life a lawyer and while in the Army was trained as a counterintelligence corps special agent. So it isn't just a question of academic freedom for me, at least. It's a question of really the basic First Amendment freedom. I am not anxious to turn our open society, as you keep referring to it, into a closed society, because they do something better in the way of

being a closed society. I think that is true, and more power to ''them'' in that terrible goal.

It seems to me that if one thing we have learned, at least I have learned in this past year, that science and technology in the international sense is really fungible. The Japanese didn't make all this technology that they have been applying. We originated it here. They applied it better. So to keep the basic information back I think is chasing a will-o'-the-wisp, some kind of a chimera, that you're pursuing.

I find it an almost pathetic confidence in the ability of government to control knowledge, when this administration has so little faith in the ability of the government to do anything else correctly.

I have great difficulty imagining our--You say we're not going to touch the basic research stuff, it's just the application. But that's pretty far down the road, isn't it?

Admiral INMAN. Mr. Shamansky, with all great respect, I don't think you have really heard--you did come late, admittedly.

Mr. SHAMANSKY. Well, I did try to read this, if it's at all a fair summary, and I apologize. I just got off the plane and came straight here.

Admiral INMAN. I have not put a proposal on the table to control anything, so any illusion to that or any reflection

back to reporting in the major news media that reflects that is flatly erroneous.

What I have said, and what I continue to pursue, is that there is an enormous outflow, not to a friend, but to an adversary, and to an adversdary which has used it to enormous advantage in building military force, shortening the research and development time to get the weapon systems greatly because of their ability to draw on that resource.

There is nothing that says that is going to slacken at all. None of the initiatives that we're doing appears thus far to be impacting on the pace of that Soviet build up. One then must turn to look at the outflow which sustained that, to say are there ways in which you can impact positively in halting that flow.

There clearly is a large measure of that outflow that is successful through espionage activities and getting hands on designs, on buying, legally and illegally, microelectronics.

There is some, much smaller, focus on research being undertaken in research centers and academic institutions. I don't accept as a premise that one can never consider constraints on public flow of information in that area, because those centers are already expert at limiting that flow when they're doing it under contract for industry for proprietary purposes, and increasing numbers of them are examining how to do that when they want to acquire patents

to help pay some of the increased costs of education. So my efforts to this point, and continually, are to draw out of that same talent ~~that has already learned the way to do that,~~ what are ways one could potentially impact on the flow out to the Soviets without being any greater a threat to academic freedom than has been that which they have already devised and accepted in dealing with industry and in dealing with their own prospects for getting patents.

Mr. SHAMANSKY. I try very hard not to use the word ''existential'' because I'm not quite sure what it means all the time. But it seems to me that this is an existential problem in our kind of society using this kind of information; namely, it's implicit, it's inherent in the situation. It seems to me--

Admiral INMAN. Mr. Shamansky, that was exactly what I was told when the cryptology issue came up. In fact, there the academic world came up with ideas, ideas which were not, in fact, those put forth by the government at all, but they appear to be working and working effectively.

Mr. SHAMANSKY. But is there anything now that would prevent--in other words, my approach right now is, ''If it ain't broke, don't fix it.'' If you're working these things out--and you're giving us shining examples of the success of what you're advocating--there is nothing in the law now that would prevent a repetition of that.

Admiral INMAN. Not at all. And the whole purpose of my dialogue from the outset has been, rather than--you needed to have been present at the AAAS to have gotten the full flavor of the scientists who were present, in large measure saying ''no regulation, no restriction of flow under any circumstances can ever be considered.''

Mr. SHAMANSKY. Then basically, I gather, you're sort of reporting on what is going on and not really asking for further legislation?

Admiral INMAN. I'm not at all asking for further legislation. I think the prospect may come down the road where legislation may be contemplated, and I am trying to play--not very successfully, obviously--the role of gadfly to get my academic colleagues to start thinking about what they can do.

We talked about legislation, Mr. Shamansky, on the cryptology issue. The academicians objected to the idea of going to legislation absolutely, and then thought they could find other ways that would meet the government's concerns. In my view, they were successful. I am looking for that same kind of wisdom to deal with a larger issue of technology transfer.

Mr. SHAMANSKY. Well, I realize it is one of the fallacies to argue by analogy, but I think of knowledge in the science and technology field as fungible. In other words, what we

1551 know here would they know in France and England and even in
1552 Argentina, and I say Argentina because we tried to have a
1553 grain embargo against the Soviets and our friends, the
1554 Argentines, sold the Soviets all the grain, you know,
1555 getting around that.
1556 So what is to prevent our allies from exercising their
1557 ability--I realize you said we have the COCOM thing, but
1558 there are other technologically-advanced nations which are
1559 working on stuff that we may not say where it's a friendly
1560 country and we'll export it there and then they'll have the
1561 industrial espionage in those place.
1562 Admiral INMAN. They are also targets, Mr. Shamansky, for
1563 certain.
1564 Mr. SHAMANSKY. Yes, and that's my point.
1565 Admiral INMAN. And we have some dialogue with them,
1566 sharing knowledge. I don't know to what degree any of them
1567 are going to address at this point in trying to deal with
1568 the problem. I do know that at least the more advanced ones
1569 share some concern about the degree to which the outflow has
1570 taken place. Whether that is going to transfer into any
1571 actions is an entirely different question.
1572 Of course, in some of those countries there is substantial
1573 government ownership which puts them in a different manner
1574 in which to deal with the large problem, but that is still--
1575 My understanding, particularly from the Chairman, of the

primary concern here was that we were going to rush pell mell off to develop legislation to somehow restrict or impede academic research in this country.

Mr. SHAMANSKY. Speaking of academic research, sir, one of the reasons I am on this committee and wanted to be is because in my home community we have Ohio State University and Batelle Memorial Institute and Chemical Abstracts, among others. I think that the future of not just my home community but this country rests in the continued effective cross-fertilization of knowledge in just this area. I am very sensitive to this, not just because of my political capacity, but my training as a lawyer and political science, in really resisting any unfortunate attitude on the part of any person in government who would rather not give out the map to the subway in Moscow because it is always easier to say no. You can't be blamed then.

That's a real problem. I mean, I don't think this is just some high-flying principle. I think it works badly at all levels of government, and I think it behooves us to be very cautious about changing that balance.

Thank you, Mr. Chairman.

Mr. GORE. Mr. Gregg.

Mr. GREGG. Thank you, Mr. Chairman. I won't use the term ''existential'' because I don't know what it means at all. I won't even try. [Laughter.] I won't even mention Clinch

River, in deference to our chairman. [Laughter.]

Mr. GORE. I was hoping that was the royal ''we'' and not the collective ''we''.

Go ahead.

Mr. GREGG. I would like to make a statement first. I think maybe I'm a little more sensitive to this because I'm lucky enough to come from the State that lent Washington Larry Brady, who has made us in New Hampshire a great deal more sensitive because of his background in this area, to what I consider the legitimate concerns of Commerce, CIA, and other federal agencies in the ''hemorrhage'', and whether it's a hemorrhage or not doesn't really matter. Even if it's just a slow creek, as far as I'm concerned, the delivery of high technology, military applicable information and materials to the Soviet Union is not good for the United States in its own self defense. Therefore, it is in order for me to be sitting on the committee that Mr. Brady should be appearing before. I am sorry I was late.

I would say this, that I think there have been some representations on the other side here that reflect the fact that there is some sort of absolute right that there should be an interchange of international knowledge and that the Soviets should have an absolute put to our scientific community just because we have a free society.

Well, as we know under our Constitution, our free society,

for example, allows travel and absolute right of travel within the United States. But as the Agee case showed us specifically, that right of travel is qualified when you get beyond the state borders.

Clearly we have an absolute obligation for free exchange of information within the United States, but when you're dealing in foreign policy and you're dealing with a nation which has invaded Afghanistan and crushed the Polish people, I think you have got to take a little more tentative position when you start delivering to them information which they can then turn into weapons and use against peoples of the world.

I think the people testifying today, the Admiral, has made it clear that they're not planning immediate regulatory activity, and I commend them for that because I will have to agree with Mr. Shamansky that the government doesn't seem to do too many things right, and maybe there is an inconsistency in asking the government to participate in this area.

But what I would like to ask the Admiral, and what I would like to ask Mr. Brady, is how can we initiate greater incentive in the private sector to participate in this effort to limit the outflow of information which has occurred? How can we encourage the cryptologist situation and other activities?

I would like to have Mr. Brady answer, and then the Admiral.

Secretary BRADY. Mr. Gregg, first I think it is useful to disestablish, as I think you have done, some of the myths surrounding this question. We cannot envelope every research activity in academic freedom. As my statement tried to point out, it is some of the new activities of research institutes, particularly associated with universities, in getting int the applied area and industrial processes area that are causing the problem.

So that what we are trying to do is to work very closely with the scientific community--and we have done that in the last few months. As a matter of fact, as the matter now stands, there are a couple of individuals in the research and scientific community where it is incumbent upon them to come to us with another meeting.

We have taken a look at our regulations. There has been an immense amount of work done by the Department of Defense, the Department of Commerce, and other agencies of this government, to arrive at what we call a Military Critical Technologies List, and in point of fact, if the government does anything by way of regulatory activity, it is going to be narrowing, in a sense, the concern to specifically address technologies that we view as immense concern, and then, of course, to bring about a better information base,

to education the business and scientific community, the academic community, to a greater extent than before, as to precisely what the regulations are, what we are trying to accomplish, and specifically narrow the focus to the technologies of--

Mr. GREGG. Does that also include educating the community as to what you perceive the Soviets are after?

Secretary BRADY. Absolutely. Admiral Inman indicated that they are working on a declassified version of what this technology transfer effort by the Soviets has accomplished. If that can be published, I think we will make great headway in that public education campaign.

Admiral INMAN. Mr. Gregg, for all of the bad things that flowed out ~~of~~, from my perspective, the coverage of my January foray into this effort, there were some things that I have been happy about. That is getting on with addressing the problem in some of the private sector areas, for which they have been kind enough to say they were spurred to do so out of that speech.

I think some of your later witnesses today will describe in some greater details. The most encouraging efforts from my point of view are the ones that have come under the National Academy of Science and National Academy of Engineering, where they have sponsored getting on with a review--The National Academy of Sciences, I believe, is

sponsoring a review of ~~security information on~~ scientific communications and national security, with a report to be finished late this year. Essentially, they are playing the honest broker role ~~at~~ that the American Council on Education played earlier in addressing the cryptology issue. So I think that is one to watch, to support, and not to intrude on, but it may well at least give us the next leg up in getting to address the issues, as opposed to just the atmospherics surrounding the problem.

Mr. GREGG. Thank you.

I would suggest also, and I think you have hit a bit of a key there in mentioning that the effect of your statement was just the fact that you made the statement. I believe the awareness level in this country has lifted dramatically over the last year on this entire issue, thanks to your efforts, thanks to Mr. Brady's efforts, and thanks to Mr. Millburn's efforts, I'm sure, too. That, in and of itself, is I think very important.

I think the average retailer or wholesaler of American knowledge and goods wants to be sensitive to this issue and is willing to take action to be sensitive to this issue. They just weren't aware of it. I think if nothing else you have contributed greatly in that area.

Admiral INMAN. Thank you very much.

Mr. GORE. Admiral Inman, you referred to the value of continued exchanges. Of course, exchanges are only one

aspect of the subject under discussion.

I wanted to ask Dr. Millburn, it has been suggested by Mr. Carlucci, among others, that scientific exchanges with the Soviets are one-sided, either because the Soviets are not as technologically advanced as the United States, or that the Soviets have not been forthcoming in making that technology available to U.S. scientists.

Do you believe that scientific exchanges with Eastern bloc countries are mostly one-sided, and if not, what, if anything, is the United States doing by way of exchange and similar programs to obtain such information?

Dr. MILLBURN. The exchange of technical information between us and the Eastern bloc I think is by and large one-sided. We do get minimal benefits back from it, primarily, from my point of view, in our ability to assess where they stand in certain areas of technology. So far as our ability to enhance our own technological position as a result of those exchanges I think is very minimal.

Mr. GORE. All right.

At this point let me enter into the record, without objection, the exchange between Frank Carlucci, the Deputy Secretary, and William D. Carey of Science Magazine on this subject.

[The information follows:]

1751 ********** INSERT 1B-1 **********

Mr. GORE. I was impressed that two of our witnesses here have referred to the willingness of the academic community to restrict the free flow of information when commercial interests are at stake, and to put restrictions on the flow where exclusive patent rights might be at stake.

To what extent do you see that as a model for future efforts by the government? Maybe my question is an awkward one, but let me tell you what I'm trying to do.

I have expressed concern in the past, as the chairman of one of the two subcommittees here, that academic freedom and the free flow of information was, in fact, jeopardized by many of the arrangements made with private corporations. I am tryng to make the point that when you all express your concern, you look at those agreements and you see, well, they're willing to do it there. And here we have a national security interest at stake. What is the difference?

Do you understand the point I'm making? You can play whatever role you want in enhancing that point.

Admiral INMAN. The point you have made is exactly one that motivated me into playing the role of goad.

Mr. GORE. I started to ask you to what extent did that--

Admiral INMAN. There is clearly a problem. I don't know how the problem is going to be dealt with, and I am not at this point prepared to offer solutions. I don't know enough about the impact on the academic side. What I was out to

get before, and on this one, is don't just automatically throw up ''academic freedom, we can't discuss anything'' as the response, because there clearly are already procedures which have been developed to deal with other problems.

Secretary BRADY. I think, Mr. Chairman, it is important to appreciate the changing nature of the ''academic institution'', specifically as it concerns the very narrow area that we are concerned about, and that is the applied side to industrial processes--you know, robotics, computers, semiconductors. That's what we are concerned about. It is specific and it's narrow.

Mr. GORE. Well, I hope some light bulbs went off in the AAU and the university community due to that response. I certainly think that they should be concerned about academic freedom in the other area as well, more so than I think they have been.

Mr. Brown, did you want to--

Mr. BROWN. May I just ask one or two additional questions?

Mr. GORE. Sure.

Mr. BROWN. Gentlemen, I have tried to review this report of the Defense Science Board Task Force, which I think is well done from my cursory review, and I want to ask possibly Dr. Millburn if he has any thoughts with regard to some of the recommendations here. I am looking at the principal

findings, I guess, where it says ''where export control regulations continue to pose a problem for the university researcher, DOD can alleviate this problem by negotiating mutually-acceptable sets of guidelines for the dissemination of research information, and publication of a new unclassified version of the Military Critical Technologies List would aid in this process.''

Would you care to comment as to whether that's a desirable direction to go in from your standpoint?

Dr. MILLBURN. Yes, indeed, it is, Mr. Brown. We are now working very closely with the university community to attempt to devise acceptable guidelines. We are addressing also the problem of achieving an unclassified version of the Military Critical Technologies List. That may be much more difficult to achieve.

Mr. BROWN. Well, I think it would probably help a little to un-classify some of that information to offset the perception, at least, that you're only classifying things over there.

There is another part of this recommendation that illustrates a problem that I made with Admiral Inman. It says, ''The large percentage of foreign nationals in graduate engineering programs is due in part to the decline of the number of U.S. citizens entering graduate schools--'' and, of course, this is undesirable from a security

standpoint.

There are two ways to approach this. One is to start screening foreign nationals and keep them down as low as possible, and the other thing, which I think is much more necessary, is to do something to improve the number of American nationals engaged in graduate training and engineering and science.

The problem with the negative approach to this is that it overlooks the positive policies necessary to really serve the national interest. I brought this point up with Admiral Inman, and I think that this may be a part of the general concern of many of us in the Congress as well as those in the universities, that in an effort to do something that appears to be negative we are missing the positive policies that need to be put in place in order to really benefit the national welfare.

I don't pose that as a question but as an explanation for some of the deep concerns that arise in some areas.

Dr. MILLBURN. I would like to suggest, Mr. Brown, that the Department of Defense has attempted to increase the number of graduate fellowships available to U.S. citizens. For example, now the Navy will have 45 fellowships, $12,000 going to the graduate student, $8,000 to the university, and these will be preferentially given in certain areas of importance to the Navy. The Army will have 25 fellowships

with similar stipends and support, and the Air Force will have 40 special assistance fellowships in the same way. So we are attempting to address the problem of correcting the imbalance between the graduate students' income and the income which they could get by going directly to industry.

Mr. BROWN. It is unfair for me to point out that if we're so anxious to copy our enemies, that one of the things they do is subsidize all of their graduate students fully.

Dr. MILLBURN. We like to be selective about the parts of their society that we adopt.

Mr. GORE. Let me thank all of our witnesses.

In closing, I want to clarify just one brief point. When you went to the AAAS, Admiral Inman, you were invited to participate as part of a panel that was set up by the AAAS on this subject; you did not request to come and make this presentation; is that correct?

Admiral INMAN. I was invited to go to that panel when I was still the Director of the National Security Agency, to make the case for the need for secrecy, which no one else was willing to do. ~~They tried a number of others~~. I committed that I would go, and I carried out that commitment, even though I had shifted jobs in the timeframe.

I think from a personal point of view, the one principal irritation was that I had prefaced my remarks that morning before the AAAS that I was there in a personal capacity. It

was the substantial media coverage later and letters attributing CIA's efforts to do things which was most irritating. In fact, a lot of my CIA colleagues wonder why I'm out playing Don Quixote on this topic, which is one I think ~~that~~ needs to be addressed.

Mr. GORE. Without objection, I think it might be appropriate to also put in the record the other two papers that were presented on this same panel, which show that it was the scientific community's initial inquiry into how to treat this subject that led to their decision to invite you, and the other two papers are quite interesting as well.

[The information follows:]

********** COMMITTEE INSERT **********

Mr. GORE. I think it is extraordinary that in an open society like ours we have the ability to discuss such a sensitive topic as this one openly with representatives from the Executive Branch. I think the way the issues was raised has been clarified somewhat. I know concerns remain.

I appreciate all of you coming here today. Mr. Brady, we're delighted to have you, Dr. Millburn, and Admiral Inman, thank you very much.

Admiral INMAN. Thank you, Mr. Chairman.

Mr. GORE. Our next panel consists of Dr. Frank Press, President of the National Academy of Sciences, and Dr. Robert Rosenzweig, Vice President for Public Affairs at Stanford University.

Gentlemen, if you would come and join us at the witness table. Let's begin, Dr. Press, with your statement, and without objection, the prepared remarks of both of our witnesses will be put into the record in full at this point.

We would like to begin with you, Dr. Press. Welcome.

STATEMENTS OF FRANK PRESS, PRESIDENT, NATIONAL ACADEMY OF SCIENCES; AND ROBERT M. ROSENZWEIG, VICE PRESIDENT FOR UBLIC AFFAIRS, STANFORD UNIVERSITY

STATEMENT OF FRANK PRESS

Dr. PRESS. Thank you, Chairman Gore.

I was hoping that with Admiral Inman's departure we could turn off the TV lights.

Mr. GORE. I think they may be interested in what you have to say, so without objection, we'll keep it available.

Dr. PRESS. I would like to thank you for the opportunity to discuss with your subcommittee the impact on science and technology of proposed government initiatives for increasing national security restrictions in the exchange of scientific

information. I am also pleased to discuss with you the coopewrative role of thue National Academy of Sciences in addressing these issues, and in seeking an accommodation between government and the scientific research community.

As your committee has recognized, the quest for that accommodation presents difficulties in finding a balance between national security and economic interests, and individual rights, including those associated with open scientific communication.

The issues leading to the current controversy are not new. They extend back over several years, over the previous administration, as public sensitivity has heightened within the United States over growing international military tensions and the increasing transfer of American technological knowhow to our foreign industrial competitors.

You have heard already that notable strides made by the Soviet Union in the military sphere have been largely responsible for increased interest in preventing the transfer of militarily sensitive products and knowledge to our nation's potential adversaries. In response to these concerns about the leakage of militarily sensitive information, various Executive Branch agencies are currently reappraising policies on the transfer of technology to foreign countries. Government officials have expressed concern in particular about foreign access to computer

science and mathematics research that bears on cryptology, and to research involving magnetic-bubble memory devices, laser-optics and inertial confinement fushion, and very high speed integrated circuits.

Public attention has also increasingly been drawn to these matters because of the significant competitive success of major industrial countries--success made possible in many instances by the apparent ease with which other industrial nations can draw upon the results of American R&D.

Technology transfer can take many forms that go beyond the acquisition of hardware or processes. The collection of data and information in the open literature, person-to-person scientific exchanes, attendance at conferences, symposia, and other open forums, and participation in university research and education, all offer the opportunity for transfer of technological data. These transfer issues pose a dilemma for the government and the university-based scientific and engineering community--one that both parties and the country generally have a high stake in resolving in a mutually constructive and satisfactory manner. Yet one, unhappily, in which recent developments point more toward polarization than consensus. The issue can be stated as follows.

Some government officials believe that a category of unclassified research results exists whose free and oipen

publication or dissemination, especially to particular foreign nationals, could pose an undue threat to the national interest and, at times, to national security. Accordingly, they think it essential to control foreign access to this information.

On the other hand, most scientists and engineers in academia hold that open communications is absolutely essential for a creative research environment. In their view, restrictions on scientific communication sap the strength and vitality of the educational and research endeavors upon which the nation's present and future technology base is founded.

Morever, such restrictions are seen as inconsistent with a free society and, in some instances, with basic constitutional rights. Neither wuld they like to see us forced to emulate the Soviet practice of compartmentalizing and restricting access to knowledge.

Traditional means by which the government seeks to protrect and promote the nation's security and technological leadership include classification of military and diplomatic secrets, surveillance and controls of foreign visitors through visa and travel restrictions, and export control restrictions outside the military intelligence security classification systems.

Increased controls over the transfer of sensitive

technical data can be achieved either by expanding the coverage of the military and intelligence classification system, through, for example, revision of the Executive Order covering such matters, or by the more rigorous application of export controls.

Expansion of the scope of classified information is highly controversial. I offer for the record a copy of a letter which I recently sent to the President's National Security Advisor on proposed changes in the Executive Order on national security information. This letter highlights the nature of these controversies from the vantage point of the scientific community.

Our major concern is that the proposed expansion of the scope of classified information into peripheral areas could force some scientific research indirectly relating to national security, out of most leading universities that will not do classified work, thus denying this important resource to the Defense Department, to the government as a whole. It would be unfortunate, indeed, if by these steps we discouraged major components of the scientific research community from continuing basic research in areas of potential importance to our nation and to our national security. We should consider how much our security is harmed by denying government access to many of the nation's most brilliant scientists and engineers who work on

university campuses.

It is apparent from the discussions this morning that the issue is not basic scientific research. None of the government witnesses proposed any restrictions in this area. But universities are involved in work on computers, lasers, materails and so on, and to restrict these may result in a closing out of a valuable resource and reduce our technical productivity. This must be balanced against potential damage to the U.S. national security, and that's the issue that we're all trying to wrestle with.

Export controls on the transfer of technical data are equally controversial. Interpretations of export regulations are often broadly cast in ways that members of the academic community believe are unnecessarily restrictive. Technical judgments are made by persons within the government who are often perceived by scientists as lacking competence in a particular topic or discipline or who are not familiar with the nature of scientific discovery. Government officials, from their perspective, think that members of the academic community are often naive or uninformed about the extent and consequences of technology transfers to other nations. Thus, it is important that we have a balanced and objective assessment of the views of both the government and the scientific community on these controversies.

Mr. Chairman, the interdependence of government and the research community in advancing science, technology and the national security requires the prevention of a breakdown of our mutual confidence. In February of this year, I communicated my concerns on these issues to the Under Secretary of Defense for Research and Engineering when I sought the cooperation of the Department of Defense in a study to be initiated by the National Academy on the impact upon scientific communication of government regulations concerning technology transfer. I have also discussed this matter with other senior officials in the Executive Branch. Steady progress has been made in recent years in rebuilding relationships between the defense establishment and the academic community, and it would be tragic indeed if current controversy marked a reversal of these efforts supported by DoD in seeking a rapprochement with the academic community.

I am very pleased to state to your committee that the Department of Defense has agreed to support and cooperate in our study, as has the National Science Foundation, the AAAS, and several private foundations. The chairman of the panel will be Dale Corson, President Emeritus of Cornell University, and a member of the National Academy of Engineering. With your permission, I would like to place in the record our announcement of this study and a list of the distinguished panelists chosen to consider this matter.

Mr. GORE. Without objection.

Dr. PRESS. The panel includes individuals fully conversant with the goals of science, the nature of universities, and issues of national security. Members have expertise in a variety of scientific and engineering disciplines, management of R&D, trade regulation and control, and relevant legal and administrative requirements. I feel certain that the panel will provide an objective and rigorous evaluation of issues surrounding the application of controls to scientific and technological communication.

The review will consist of the following elements:

An examination of the advantages and disadvantages of free communication in two or three specific fields of science and technology, such as mathematics relating to cryptology, very high speed integrated circuits, and artificial intelligence.

A review of the policy and operational concerns of the respective government agencies, universities, scientific societies, and researchers. The goal here is to identify issues where there is common agreement, to expose those where apparent disasgreements are based on misperceptions and misunderstandings, and perhaps to narrow and sharpen the focus on issues where genuine differences exist.

The panel will conduct a rigorous evaluation of critical issues concerning the application of controls on the flow of research information, and the effects of such controls on

scientific and technological progress.

And will develop recommendations and conclusions concerning: the intended and proper reach of controls, vis-a-vis various categories of science and technology; areas of science and technology that are or should be outside of operational controls; approaches that could provide more certainty and predictability to the regulatory system; and alternative procedures that might prove acceptable to all of the concerned sectors.

Mr. Chairman, there is one other important matter which I feel should be addressed. The Academy currently operates interacademy exchanges with the USSR and Eastern Europe, as well as with China.

For decades, the State Department has obtained waivers to provisions of the Immigration and Naturalization Act barring U.S. entry to members of Communist parties and certain other categories of aliens, thus enabling Soviet and Eastern European participants in the interacademy exchange program to obtain nonimmigrant visas. Prior to authorization of visas in such cases, the State Department passes judgment on the acceptability of the proposed program of the intended visitor. In years past, the clearance procedure has been relatively routine and only occasionally did significant problems for exchange administration of this program arise.

However, heightened sensitivities to technology transfer

issues have led to increasing difficulties in the Soviet exchange program.

I believe that our exchange program with the Soviet Union should not provide either side with any relative advantage, that it should be balanced, with a roughly equal flow of information in both directions. I think that areas of critical technology should not be included.

That said, I think it is in our interest to cooperate with the Soviets. They are a world class scientific and technological nation. In such areas as--and I have just jotted these down--condensed matter physics, high energy physics, astro-physics, nuclear fusion for energy, MHD, earthquake prediction, electro-metallurgy, certain aspects of cancer and coronary disease, planetary exploration, the Soviets operate at our level. I believe it is in our interest to work with them in these areas where there is a mutual flow of information in both directions.

In balancing this equation, we should take into account that the social scientists that we send to the Soviet Union are playing an important role. There are too few Americans who speak Russian, and yet who also know the politics, the culture, the economy of Soviet institutions. I believe it is to our advantage to train such scholars by sending them to the Soviet Union, and that should be used in our equation for balancing the degree of flow of advantage in both

directions.

In conclusion, I believe this study which we are undertaking in cooperation with the government provides an ample framework for an objective assessment of the relationship between national security interests and open scientific communications. I do not want to prejudge the panel's recommendations. I am sure, however, it will consider the advantages and disadvantages of exchanges with Soviet bloc countries in areas of critical technology and in basic scientific areas; review restrictions on such exchanges and whether they are justified; and evaluate the ability and willingness of universities to enforce them. It will provide an opportunity to narrow and define the issues in which genuine differences may exist in the hopes of strengthening mutual understanding and confidence.

Thank you, Mr. Chairman.

[The statement and attachments of Dr. Press follows:]

********** INSERT 1C-1 **********

Mr. GORE. Thank you very much.

We will hold our questions until we have heard from Dr. Rosenzweig. Please proceed.

STATEMENT OF ROBERT M. ROSENZWEIG

Dr. ROSENZWEIG. Thank you, Mr. Chairman.

The concern that was expressed this morning by the very interesting panel that preceded us, and that has been expressed elsewhere in the press and other places, derives in large part from the broader fact that the United States no longer enjoys the wide margin of superiority in science and technology that was ours for more than a quarter of a century following the close of World War II. It is widely believed that if we lose that advantage over our adversaries, we would face a very substantial threat to our national security.

It sohappens I believe that conclusion is correct, and because it is, it is critically important that we understand the sources of our remaining advantage and that we adopt policies that will preserve it. There is some risk, I believe, that we may do just the opposite, that in our determination to maintain our edge we may choose an approach that has an attractive surface validity, but which will, in fact, have effects exactly opposite those that are intended.

The main danger, it seems to me, lies in that part of the diagnosis that ascribes the current situation to the fact that university-based science is open and its results freely available. Not the least of the consequences of that faulty diagnosis is that it could cause a bruising confrontation between the government and universities.

Now, the specifics of that diagnosis focus first on the unbalanced nature of scientific exchanges between the United States and the Soviet Union, in which the Russians send scientists and engineers to learn from the advanced work of American laboratories what they are apparently unable to teach themselves, and in which we send humanists and social scientists to work in those libraries and archives that the Russians are willing to hold open for us.

Second, and perhaps even more important, is the assertion that the very nature of our scientific enterprise, with its emphasis on free communication of research results, exposes our most advanced work to the eyes of anyone who is willing to pay the price of subscriptions to freely available technical journals.

I think there are probably more important explanations of the current situation and it is worth examining them briefly. It seems to me far more likely that the extraordinary dominance enjoyed by American science and technology at the close of the war was a product of the

exhaustion of our enemies and our allies, and of the unparalleled flow of brilliant scientific talentfleeing from the totalitarian regimes of Europe. The recovery of the leading powers of Europe and of Japan was to be expected; the application of the talent and energy that exists in other places was bound to reduce our advantage. Moreover, those who were starting over did not have to reinvent what had already been discovered.

What is far more interesting, it seems to me, and much more relevant to current policy, is how we have managed to sustain the edge that we have over a broad range of scientific areas in spite of the energetic and determined competition by others. What, in other words, are the sources of our continuing strength? I suggest that it rests on five major elements, and I will simply list them in no particular order of importance.

First, we have an economic system that rewards and therefore encourages risk taking. Working with new technology is inherently risky. Bureaucracies, in contrast, are risk-averse. Centrally directed, and therefore highly bureaucratized, economices share that quality. On the whole, we do not, and that is a source of strength for us.

Second, we have an educational system that by and large makes it possible for talented people to go as far as their talents will take them. Thus, our pool of talent is far

larger than elsewhere in the world.

Third, we have a tradition of higher education in this country that connects it with the requirements of the society it serves, while also protecting it from distortion by those same requirements. It is a tradition that is especially relevant to the health of science and technology, as shown by examples as diverse and reaching as far back in our history as the role of the land grant colleges and universities in the growth of American agriculture, the importance of the links between such universities as MIT and Stanford, and the electronics and computing industries, and the emerging set of connections between universities and industry in the field of biotechnology. There is nothing analogous to this phenomenon elsewhere.

Fourth, in this country we link fundamental research and research training. They are done in the same place, universities, and by the same people, faculty and graduate students. Indeed, the activities are simultaneous and indistinguishable. Thus, research is refreshed by the best young minds, and the best of our young are trained by the best of our senior people. This, too, is a source of great strength.

And finally, we have a scientific structure that puts a high value on the free communication of scientific results. This has two enormously valuable sets of consequences. The

first is that good people are very quickly recognized, and so are those who are less good. And second, good results can be rapidly confirmed and quickly become the platform for further work, while error can be rapidly identified and set aside. If there were no other justification for maintaining the traditional openness of our scientific work, it could be justified on the grounds of its value as an economizing device alone.

Now, any solution to the problem of technology leakage that does not take account of those elements of our strength, any solution, in short, that does damage to the sources of our strength, will produce results far worse than the problem it purports to solve. Policies aimed at protecting American security by keeping from others the fruits of our science and technology must be tested against that standard, no matter how plausible they might otherwise seem. Specifically, we should look at the two alleged causes of leakage in that light, the two that have to do with universities, I should say.

The first of those is the uneven nature of exchanges between the Soviet Union and the United States. The first thing to be said about that subject is that it is true, that we and the Russians treat these exchanges quite differently, and that they derive more tangible benefits from them than we do. That is not to say that we derive no benefits at

all. As others have said, we have precious few points of access to that closed society, and while we have little to gain from their science and technology, we have much to lose from ignorance of Russian institutions, processes, motives and purposes.

Still, there is no denying the systematic way in which the Russians plan for and profit from the opportunities afforded their people in this country. What needs to be said is the fact that its control is wholly within the powers of the United States Government right now. No legislation, no increase in authority is required to limit Russian access to what is deemed to be sensitive training and research. Under existing agreements, the State Department must approve the program of study of a Russian scientists before he can be assigned to an American university. If the course of study is sensitive, or is closely connected to sensitive work, the remedy is to veto the application.

Mr. GORE. Dr. Rosenzweig, if I may interrupt you there, I think there is a difference between disclosure and technology transfer. The ability of the government to restrict entry visas for reasons of technology transfer is not as settled a question as their ability to deny a visa for someone that poses a national security risk; is that not so?

Dr. ROSENZWEIG. I believe within the context of the

formal exchange agreements that have been negotiated under the Cultural Exchange Agreements, that programs of study must be approved before a visa is issued.

Mr. GORE. I'll pursue it. I shouldn't have interrupted you.

Go ahead.

Dr. ROSENZWEIG. The explanation of some recent controversies, including one in which Stanford was involved, was that the State Department proposed to admit a Russian visitor and allow him to come to Stanford, but only if we would agree to prevent him from seeing and hearing things that are perfectly open to everyone else. Moreover, we were asked to assure that he would not see any nearby businesses.

Now, in our view, that was bad policy. It was a complicated and almost certainly ineffective solution to what was really a fairly straightforward problem. If the work going on at Stanford was judged to be too sensitive to be exposed to a Russian visitor, then the solution was to keep him away from the university, not to ask the university to play policeman during his visit.

It strikes me, though, that whatever problems derive from scientific exchanges ought to be manageable. The governing principle should be that the decision about whether a particular individual proposes to pursue an inappropriate program properly belongs to the government. Once an

individual is admitted for study, however, the institution at which he is working should not be asked to become less open, more secretive.

The general problem of the ready availability of the results of American scientific research through the open literature is at once easier to comprehend and far more difficult to deal with. It is true that our scientific literature is open and freely available. It is also true that this fact enables others to profit from our work, thereby narrowing our margin of superiority. But as I have already suggested, the more important question is what accounts for our margin of superiority in the first place. If it is correct that the very openness that is to the benefit of others is also an important factor in maintaining our advantage, then we would tamper with it only at our peril.

Surprisingly, there is very substantial agreement on that point. Even those who would like to shut down the flow of certain kinds of information are usually quick to say that they do not propose programs of government censorship or extensive new classifications of research projects. More commonly,. the call is for some kind of voluntary self-regulation, a system of voluntary pre-publication screening of research results, so that findings with potential military application can be kept out of circulation.

That is a seductive notion. Indeed, in narrowly circumscribed fields of study, it might even work. Furthermore, so long as the final decision on publication remained with the scientist and not with the government, there is no insurmountable barrier of principle. Such agreements now exist in some government and industrially-sponsored research, and the field of cryptography is now engaged, as we heard, in a two-year test of such an understanding.

Parenthetically, the question of restricting publication in order to protect patent rights is, I think, quite widely misunderstood, if I may just say a word about that here.

The purpose of the patent system, as is made abundantly clear in the Constitution, in which it's embedded, is specifically to ensure the free flow of scientific and technical information. Therefore, brief delays in publication in order to allow for the filing of a patent are justified in academic terms precisely in order to make full and free dissemination of knowledge possible; that is, to avoid the kind of secrecy that is motivated by the need to preserve a competitive advantage that can't be protected under the law.

Well, in any event, I doubt seriously that the voluntary solution has wide applicability. My sense is that the more widely agreements of that sort were to be extended, the more

difficult they would be to enforce, the more frustrating the failure to abide by them would be, and the closer we would therefore be to the next steps, namely, required pre-screening and government control over the decision to publish.

I don't know anyone who now wants that result. It is important to keep in mind, however, that the impulse behind regulation of any kind, voluntary or otherwise, is a perceived threat to national security. As we heard this morning, that is a uniquely unanswerable argument. If we accept the premise that our national security is threatened by the free communication of research results, then the only policy dispute that remains is over the effectiveness of this or that means of making it less open.

I submit that the premise is wrong. We should reject it. Our security, our health, and our prosperity will be served best by adherence to the principles and practices that have been our main sources of strength.

It has always seemed risky, Mr. Chairman, to run an open society. Perhaps that is why there are so few of them. But when citizens and leaders alike have been willing to take the risk, as ours have been willing to do throughout our history, the most marvelous engine of creativity is set in motion. That, I submit, is our real advantage. Why on earth would we want to give it away?

2419 Thank you.

2420 [The statement [illegible]. Rosenzweig follows:]

2421

2422 ********** INSERT [illegible] **********

Mr. GORE. Thank you very much.

Dr. Press, how soon can we expect the recommendations from the National Academy panel studying this matter?

Dr. PRESS. I am hopeful that most of the briefings and discussions can take place in the next month or two, so that by September would could have a presentation to the government about what we found out and what our views are, in an interim fashion, and that may be very close to our final report as well.

Mr. GORE. I wonder if you could come back to another joint hearing of these two subcommittees when that report is complete.

Dr. PRESS. I would be happy to.

Mr. GORE. Dr. Rosenzweig, among the many questions I want to address to you and to Dr. Press. let me go first to the one that you alluded to just briefly with your statement on patents assuring the free flow of information.

Of course, while that's true, that is far from the extent of the threat posed to academic freedom by the contractual arrangements that you and I have discussed on several occasions; you would agree with that, wouldn't you?

Dr. ROSENZWEIG. Yes, I would.

Mr. GORE. Were you surprised to hear Admiral Inman and Secretary Brady say that the willingness of the academic community to accept restraints on the traditional view of

academic freedom in the name of preserving contractual arrangements with businesses in part led them to see the need, perhaps the viability, of similar restraints, where the government's national security interests were involved? Were you surpised to hear them say that?

Dr. ROSENZWEIG. No, I was not. There is an apparent kind of symmetry there. Admiral Inman at several points took pains to make clear what he actually said as opposed to what he was reported as saying. I think I can help him on this point.

What he actually said in that talk, primarily at least, had to do with the consulting arrangements of faculty, rather than the contracts for research between universities and industry. It is true, that in their individual consulting arrangements faculty frequently undertake to maintain a confidentiality or a secrecy in ways that are quite inappropriate in the context of an agreement between a university and a business enterprise, in which graduate students are involved, in which publications are expected to emerge.

Even in that latter point--As you may know, I was involved over the weekend in a meeting at Paharo Dunes, which produced a set of statements which were reported in the press yesterday and this morning, on the subject of bio-technology. The subject of secrecy was discussed, I would

say, in quantitative terms, as much as or more than any other single subject that was addressed. There was widespread agreement among the university presidents and other university administrators, among the faculty who were present, and among the businessmen who were present, that there is no significant advantage to business in the kind of secrecy that most people are concerned about. They do want enough time for protection of their patent interests. They don't have any significant interest in having universities protect trade secrets and other unprotectable kinds of information and, in fact, would typically be rather reluctant to make that information available to universities in the context of these agreements.

Indeed, the agreement on the necessity to avoid secrecy was not only the first in order or presentation in the document, but I think was central to everything else that followed from it.

Mr. GORE. I want to commend you and Dr. Kennedy at Stanford for hosting that meeting. Of course, you and I have had a number of private meetings about how the university community might go forward in this area. But I am concerned that when you have scientific conferences and corporate lawyers review the presentations made at academic conferences for disclosure of trade secrets, that the cross-fertilization that my colleague from Ohio mentioned earlier

just doesn't take place in the same way that it might otherwise.

Dr. ROSENZWEIG. I don't mean to say there are no problems, and I think it may help to be a little more precise about what they are.

Specifically with respect to publication, I think it is generally agreed there is little, if any, problem. That is to say, our licensing people at Stanford assert categorically that they can move to protect the patent on an invention faster than any scientific journal can publish, so there is no conflict between publication and protection of patentable information.

There is a special problem that has to do with the presentation of research results in non-publishable form, either in seminars that are open to the public, or in scientific conferences. It is not clear that there is a useful university policy that governs that. The universities that were present at that meeting certainly all would articulate as a matter of policy that it is not desirable to encourage delays for that purpose. They all recognize, though, that they're dealing with individual faculty members, some of whom would be secretive if there were no commercial motive at all. I mean, it's just in the nature of their personality structure as scientists to withhold more than others do.

It is hardly conceivable that President Kennedy or Derrick Bach or the other presidents who were there would instruct their administrators to go to their faculty and say ''please don't give that paper'' in order to protect some commercial interest. I mean, that just doesn't happen in a respectible univeristy--and most universities are respectible, most of the time.

So there are some special problems involved, but I think it is not as broad and general a problem as it may have been thought to be.

Mr. GORE. It seems to me that universities charged with safeguarding the great heritage that American universities have are rightly concerned about a threat to academic freedom which may come from statements by the national security apparatus, and also ought to be concerned about the threats to academic freedom resulting from a trend of much closer relationships between universities and corporations.

Dr. ROSENZWEIG. Yes.

Mr. GORE. You're from a university that has recognized that concern. Many others have not. I wish that more would. We're going to pursue that issue as well.

I wanted to briefly follow up on the ability of the government to deny visas to scientists in exchange arrangements when a technology transfer threat is imposed.

I agree with your interpretation of the law, that they can

do so. When I interrupted your prepared remarks, the point I was trying to make is that there is disagreement in the Executive Branch about what is required to deny a visa to a visiting scientist from a foreign country if there is a specific technology transfer threat associated with that visit.

I agree with you, that if the government has that concern, it should not shift the burden of policing that individual's activities in this country to universities that are not used to playing such a role, but rather should do a better job of controlling access to the country of people who may be coming here for that specific purpose, if the government decides that it's a problem in a particular situation.

I take it that both of you would agree that the university community could be more sensitive than it is to the problem that Admiral Inman was describing. Is that an awkward way to put it, or--Yes, Dr. Press.

Dr. PRESS. Well, I think it is important for us to receive the kind of briefing that he referred to. I haven't seen the classified information that you have seen. I would like to see him make his case about the degree of damage, even though he said it was a very small percentage. I would like to see what that percentage is, and I am sure this panel we are establishing will have access to that information and will get that briefing.

Absent that information, it is hard to take a position on what is the relative damage compared to the damage to our own institutions by any proposed either voluntary or other form of restriction.

Mr. GORE. Dr. Rosenzweig?

Dr. ROSENZWEIG. I agree with that.

Mr. GORE. Okay. Mr. Brown?

Mr. BROWN. Gentlemen, I raised the point with Admiral Inman with regard to his statement on the current outflow of technological and scientific information in which he said that this was damaging to the national interest and to the national security. I want to raise with you the question of how you distinguish between national interest and national security.

Is there a clearly defined, straightforward concept of the national interest that you gentlemen are aware of and are prepared to explain to me?

Dr. ROSENZWEIG. I would answer that No. I think it is easier to talk about the national security than it is to talk about the national interest. National interest, like public interest, like a lot of other terms that are used frequently, tend to be used to describe the position of the speaker rather than some external reality that we can find out there. It's a difficult area.

I have not, by the way, once--and I hope it has been

noticed--used the term ''academic freedom'' in my remarks. My position is that a genuine concern for national security leads one to the conclusion that the way we do business in this country is the best protection for our continued national security that we can find, and that departures from that way are short-sighted and liable to do more damage than good.

Dr. PRESS. If I may respond in another way, there is a narrow way to describe national security in terms of specific Soviet military systems that have integrated circuits that were designed primarily by us, and that were obtained by them in some clandestine way or another. I think we should take a broader view of our national security, for example, recognizing the role that university research plays and what university research contributes to our national security. The basic concept of the computer and the stored program computer, communications theory, new kinds of materials, these are being developed on university campuses. The semi-conductor industry itself recognizes that it is under-invested in basic research and it is now turning to universities to undertake that research supported by that industry. So these universities are a valuable national resource and we should again balance the equation of leakage on one side to the enormous contribution the universities make in their open and unrestricted research to

our national security.

Mr. BROWN. As long as we're speaking about that, Admiral Inman is going to provide us with more detailed information about the losses that are potential with regard to certain militarily-sensitive technologies, or is going to try to list those for some of us.

I have not seen well quantified the advantages from maintaining a balance, let's say, more in the line of open communication. Both of you have made very effective statements on that.

Dr. Rosenzweig, you made what I thought was an excellent statement in an article that you wrote for the Mercury News, in which you quoted one of our eminent science writers along the following lines: ''The reason we are ahead of the Soviets in science and technology has nothing to do with expenditures, talent or ambition, and all three departments of the United States and the Soviet Union are lookalikes. What sets the two countries apart and makes the U.S. dynamic and creative and the Soviet Union clumsey and needful of scientific larceny is that our research is mostly open and theirs is mostly secret. That is the unanimous report from emigres, defectors and foreigners who have visited Soviet research centers.'' That wasn't your words, of course, but you quoted it with presumed approval.

Does it still represent your views?

Dr. ROSENZWEIG. Yes, it certainly does. I don't ordinarly--I am happy to quote Dan Greenberg--but I don't ordinarily quote Edward Keller. But, as you know, he has been eloquent in his comments on this issue, specifically in his observation that the area in which we have the least lead, and which we may even be behind the Soviet Union, namely, nuclear technology, weapons technology, is the area that is hedged most around with secrecy.

People say there is some connection between those two. I don't know that they are connected. It's an interesting observation.

Mr. BROWN. Well, as you point out, it is true that the original legislation with regard to atomic energy prescribes some of the most rigorous standards for secrecy that is available to any sector of technology in this country. It is hard for me to understand your statement, therefore, that the Russians are ahead of us in this area.

Are you prepared to validate that?

Dr. ROSENZWEIG. I only know what I read in the newspapers on that subject, Mr. Brown.

Mr. BROWN. Are you hinting or, by parallelism, implying that if we rigorously enforce additional secrecy in other areas that we may similarly fall behind the Russians?

Dr. ROSENZWEIG. Yes.

Mr. BROWN. You're speaking as a political scientist, of

course.

Dr. ROSENZWEIG. That's correct, which is to say a non-scientist.

[Laughter.]

Mr. BROWN. That's the view of this administration, of course.

I want to go back to the statement about the national interest. It seems to me that some of our concerns about restriction on the flow of scientific information and technology stems from a concept of national interest rather than national security--and I am not implying that this is bad. But I would like to refresh your memories and ask for you to comment on the fact that President Carter felt that our national interest required us to cut off shipments of grain to the USSR; President Reagan felt our national interest required us to resume shipment. Likewise, President Carter felt that it was in our national interest to provide technology for, say, natural gas pipeline laying equipment, and President Reagan feels that it is in our national interest to cut off that kind of technology.

The point of this is obviously, when you start talking in terms of national interest, you have a much wider range of disagreement as to what the national interest is, and a much grater need for the involvement of a knowledgeable policy-making body of some sort in reaching a consensus on this.

Would you agree or disagree with that statement?

Dr. ROSENZWEIG. I would like to distinguish, in response to that, quite sharply between the situation with respect to scientific and academic exchanges and a situation with respect to the way in which we conduct our own scientific apparatus establishment in this country.

The exchange agreements, it seems to me, have always been, were in their initial impulse, and have been in their operations over the years, to a large degree, political, that is to say, an instrument of diplomatic relations between the United States and the Soviet Union. Now, they have had important academic values and other things associated with them, but they have been turned on when things have been going well, and shut down when things are going badly. Kinds of restrictions of the pettiest nature have been imposed on our people by the Soviet Union and on their people by us in return.

I just don't see those as fundamental to the American academic enterprise, although I strongly believe in the intrinsic value of a free exchange of science. Since I don't think that science is a national enterprise particularly, it is, more than almost anything else, properly conceived an international enterprise. But realism dictates that we just have to look at this subset of that in more political terms than we do others, and therefore I am

less troubled by hedges on those programs than I am about efforts to change in very important ways, indeed, in fundamental ways, the way in which knowledge advances best.

It strikes me that the evidence is overwhelming that knowledge advances best when the communication of knowledge if freest and most open. I can't give you numbers to prove that, but I can ask you to view of evidence of our census.

Mr. BROWN. I am sorry that you can't give us numbers because I am hoping that you or other witnesses can help us to at least define these advantages as fully as possible, because obviously, they are an essential ingredient in the balancing process that has to take place here.

Dr. ROSENZWEIG. It's possible that others can. I am simply saying I am not able to do it.

Dr. PRESS. There is no question, Mr. Brown, about the political nature of some of our cooperation agreements with other countries. I am told of one former Secretary of State who signed a science cooperation agreement every time he landed for a refueling stop.

But by and large, the scientific community itself supports these agreements for the simple reason that communication, the sharing of results, makes their own work more effective. That has been so, and it can be documented, case history after case history.

Take the area that you're familiar with, nuclear fusion.

TOCOMAC is a Russian word. Some of the original theoretical concepts were brought here by Soviet scientists. At one time in our exchange program the Soviets were telling us things about nuclear fusion that we had classified. That's an example of where two advanced nations working together can push more rapidly a technology that may be extremely important to the future of our world, namely, an alternate source of energy when our fossil fuels are gone.

So it is true that we have these political motivations and it is true that the budget to a certain extent goes up and down with the atmospherics, but I think one shouldn't underestimate the value that scientists recognize in this, namely, working together does make the global productivity in science more effective.

Mr. BROWN. Well, I am just trying to elaborate on the distinction, if there is one, between the concept of national interest, which does allow for some of this tit-for-tat kind of thing, and national security, which presumably is a standard which doesn't allow for that.

Of course, I think the IIASA case at present is one of those which, as Admiral Inman pointed out, is not strictly a security matter. It is slightly involved perhaps. But the concept is being advanced here that the national interest dictates or at least leads us to severe this particular relation.

I would suggest that that's a perfectly legitimate concept to take if you agree with the particular political philosophy behind it. Even the Academy has not been above doing a little tit for tat in connection with cutting off or reducing scientific exchanges in an effort to get the attention of the Soviet Government; am I correct?

Dr. PRESS. Are you referring to the human rights question?

Mr. BROWN. Correct.

Dr. PRESS. Yes, that's correct.

Mr. BROWN. So we're not talking about absolute principle. We're talking about a matter again of balance within the confines of a particular political philosophy.

Dr. PRESS. Human rights is an issue that is a matter of principle.

Mr. BROWN. Well, let's say a conflict of two principles.

Dr. PRESS. That's right.

Mr. BROWN. Thank you, Mr. Chairman.

Mr. GORE. Mr. Shamansky.

Mr. SHAMANSKY. Thank you, Mr. Chairman.

Dr. Rosenzweig, I found your testimony both eloquent and, of course, excellent. I am glad to have heard it.

Dr. ROSENZWEIG. Thank you.

Mr. SHAMANSKY. Having previously described my home as the location of Ohio State and Batelle and Chemical Abstracts,

we also have other information industry units like Compu-Serve which serves the insurance business, and Bank One which does the computer work for Merrill Lynch, and a number of others--Wonderamics Cube started their two-way, interactive TV thing.

What I am getting at is that it is my understanding that in the area of cryptology, it is going to become important in the future for methods to be devised to protect legitimately the information of these various clients of these organizations that I'm referring to here.

Do either you or Dr. Press have any information or an opinion as to how well is this cryptology thing working? Admiral Inman cited it as being a glowing example of what he had in mind. I accepted that initially. Is it so good, in your opinion?

Dr. ROSENZWEIG. I think Admiral Inman's conclusions may be premature on that. He may well be right, but it's early to say.

I had occasion over the weekend to talk quite a bit with Chancellor Heyman from the University of California, Berkeley, who was the chairman of the committee that put this together, and it is quite clear that the members of the committee--at least the academic members of the committee who were involved in making this arrangement--were not unanimously persuaded that it was necessary or desirable.

What they said essentially was that ''we are told that there is a problem here. We are not in a position to validate the existence of that problem ourselves, because the evidence for it can't be given to us, but we are willing to assume that the people who tell us there is a problem are right; therefore, what can we do to find out experimentally whether the problem exists, and if so, how great it is, and if so, whether trying to solve that problem will do more harm than good.''

So they set up a system in which this very narrowly circumscribed field of people--I mean, everybody in that field knows everybody else; it's not a very large field of science--agreed voluntarily to submit their papers for review to NSA, I guess it is, or whoever their contract monitor was. If they were asked to withhold that paper, or change it, in part, they had the right to appeal that decision to an impartial board, which consisted of a group of scientists and a group of government people, who evaluated the claims of the government and the claims of the scientists, and reached a conclusion, which the scientist was able to accept or reject, and in the end publish if he or she chose to.

There are several things to be said about that. It's a very cumbersome arrangement, obviously. If you extend that over many areas of science and much larger numbers of scientists, you have an administrative problem of very

substantial dimensions.

The second thing is that it was established for either a two- or three-year experimental period. They just finished the first year, and the evidence is quite ambiguous, I think, about the extent to which there is a problem, as evidenced by the number of papers that have been challenged, and the extent to which the members of the community have been willing to agree to it and the way the apparatus is working. So it's an interesting experiement but I don't think it ought to be used for anything more than that at this point. I think it's a mistake to overlearn from that experience and to extend it prematurely to much broader areas of science and technology.

That's my own sense of that situation.

Mr. SHAMANSKY. Dr. Press, you have a more scientific, as distinguished from the unscientific, political science field, and I am concerned, as I mentioned a moment ago, about being able to improve the cryptological science. I think it is an important science and would have important applicability to the flow of information, the successful flow of information by those companies and entities that work in that area. That's very important in my home community.

Do you share the feeling that I'm getting here, that these restrictions may end up hurting us more than it hurts those

we're trying to deny the information to?

Dr. PRESS. I think that the point you make, that cryptological research has a private sector, nongovernmental sector of interest, of large commercial value, is a good one. That is the case for the reasons you cited.

Also, that kind of research is a legitimate branch of pure mathematics. Factoring large prime numbers is something that mathematicians have worked on for a long time. So you're entering now the area of pure mathematics, and because there's a possible connection, there are possible restrictions on it.

I am told that in the first 30 papers submitted for clearance, all 30 were cleared within 30 days, 30-30. So, so far, it seems it has hardly had any effect on research in that area.

I should point out there are a number of universities who refused to subscribe to this experiment as a matter of principle and because of concern for extension into other areas, as has been proposed. I would like to suspend judgment and see what happens in the next year, and if it works, then into other areas, I would start worrying severely.

Possible restrictions in extremely rare cases, very, very rare cases, where the national security can demonstrably be shown to be at risk, I don't think one should rule those out

as a matter of principle. One should hear the case on both sides. But if this were a way of life, extended to more than extremely rare examples, then there might be some cause for concern.

I think the government witnesses had in mind only a few technologies and they would claim that their application of possible restrictions would be rarely invoked. But to what extent that will occur, what they mean by that, I think those are the issues that we will be exploring in the months ahead.

Mr. SHAMANSKY. Are you familiar with any explicit cases in which there has been a gross disclosure of something on which there would have been unanimous agreement that it should not have been disclosed in the first place?

Dr. PRESS. From universities?

Mr. SHAMANSKY. Yes, or even anyplace.

Dr. PRESS. In terms of industrial concerns, the clandestine transfer of hardware, of microprocesses and that sort of thing, I believe that has occurred. In terms of the kind of research that goes on in universities, where you are not dealing with state-of-the-art manufacturing know-how in critical technologies, which was Mr. Brady's concern, I would be surprised if serious damage has been done to our country.

But again, I would like to have the briefing that we've

heard about, that claims a small amount of damage has occurred.

Mr. SHAMANSKY. The matter of espionage, whether it be industrial or military, it seems to me that is a problem at all times anyway. Do you think the kind of procedures hinted at by the Admiral would in any way lessen the--

Dr. PRESS. There is one way to be sure to minimize the damage from such espionage, and that is to stay ahead, by making the proper investments in R&D and education, capital inestments in productivity and so on. That is a way that we have stayed ahead before successfully, and if we can get our institutions in order to do the kinds of things necessary to maintain our scientific and technological leadership, that would give me personally a greater sense of security in these areas.

However, as I said before, I do want to hear the government's claims that damage has been done, and I haven't heard it.

Mr. SHAMANSKY. Thank you very much, gentlemen.

Thank you very much, Mr. Chairman.

Mr. GORE. Thank you.

Dr. Rosenzweig, I would like to ask you to express for me what you believe the reaction of the university community was to Admiral Inman's initial statement and the way it was perceived.

You said in your testimony that the last 30 years of government-university relationships have been assisted by a rare degree of understanding and sensitivity on the part of the government. I take it that you felt the recent events eroded that relationship.

What was your reaction to the statement--as it was reporte anyway?

Dr. ROSENZWEIG. I missed the disclaimer that Admiral Inman said he started his speech with, namely, that he was speaking as a private citizen.

Mr. GORE. Were you at the meeting?

Dr. ROSENZWEIG. I was not at the meeting, but I read the full text of the speech afterwards.

I must say that I wouldn't have been, I don't think, terribly impressed by that disclaimer, since I don't think it is possible for the Deputy Director of the CIA to speak on an issue of substantial interest to his public responsibilities as a private citizen, any more than a university president can speak on an issue of educational policy as a private citizen. You are your role, to some

extent, and that's just a fact of life.

I was very much concerned about some of the things that Admiral Inman said, in the surrounding context in which Under Secretary Carlucci had been saying similar things, and which Secretary Weinberger had been saying things that sounded similar. My concern was that people in high positions in government were resonding to a problem by reaching for what was superficially the simplest solution to it--''if somebody is getting what we have, then keep it away from them.'' That struck me as a wrong and dangerous solution to the real problem, which is, properly stated, I believe, how is it that we have what we have and they don't have it, and what can we do to maintain that advantage. Looked at that way, I think you come up with a different set of solutions.

Mr. GORE. What was your reaction to his statement here this morning?

Dr. ROSENZWEIG. Well, I guess I'm not enormously reassured. I don't think--I have no reason to believe that Admiral Inman has any less concern for the values that I believe in than I do. I think he has another set of concerns that compete with those values and may override them. I worried about his expressed concern about what may happen six months or 12 months or 18 months from now if this hemorrhage is not staunched.

I would put it at this point at the level of concern rather than alarm. I also find a good deal of very helpful response from the community at large and from the political community. These hearings are an evidence of that response. So I don't see us barreling down a one-track railroad with nothing in sight except disaster at the other end of the line. I think we're engaging in a process here that has some controls in it, and if we're alert and vigorous to our own interests, we can probably help to shape that.

Mr. GORE. Well, it is the hope of these two subcommittees that a dialogue like this one can lead to a better result than might otherwise be the case.

One final question, Dr. Press. What do you view as the appropriate role of the National Academy of Sciences in mediating or refereeing disputes of this kind? Have you been put in the middle when you don't want to be put in the middle?

Dr. PRESS. I don't think we want to mediate or referee at all. I believe we want to understand these issues, the constitutional questions, the questions of the nature of science and how science is impeded by certain kinds of restrictions, national interest in the broadest views that Mr. Brown has defined, and make some recommendations to both universities and the government for some degree of accommodation, if that's necessary.

But we are a private organization, not a governmental one, even though Congress did give us a charter back in 1863, and I am even worried about playing the role of an honest broker, because honest brokers usually get squeezed by both sides.

However, I think the nature of our panel, the wisdom represented by the membership on that panel, is such that both sides will seriously consider their recommendations. That, I think, is the essence of what our contribution will represent.

Mr. GORE. Well, we will look forward to hearing back from you when your panel has completed its work.

I would like to thank both of you for a very eloquent and effective statement. Thank you very much.

Dr. ROSENZWEIG. Thank you, Mr. Chairman.

Mr. GORE. Before calling our final panel, I would like to have about a five-minute recess, no longer than that, and if our next panel could work their way to the witness table in the intervening recess, we will come back in five minutes.

[Recess.]

Mr. GORE. The subcommittee will come back to order.

We would like to call our third panel, Dr. Robert Corell, Director of the Sea Grant and Marine Programs at the University of New Hampshire, and also representing the National Association of State Universities and Land-Grant Colleges, and the Sea Grant Association; Dr. Edward Gerjuoy, Professor of Physics at the University of Pittsburgh, who is also representing the American Physical Society; and Dr. John McLucas, President of the World Systems Division at COMSAT.

Gentlemen, we would like to welcome all three of you. Without objection, the entire text of your prepared remarks will be included in the record in full at this point. We invite you to summarize or to present your statements in such a fashion as you see fit, beginning with you, Dr. Corell.

STATEMENTS OF ROBERT CORELL, DIRECTOR, SEA GRANT AND MARINE PROGRAMS, UNIVERSITY OF NEW HAMPSHIRE; EDWARD GERJUOY, PROFESSOR OF PHYSICS, UNIVERSITY OF PITTSBURGH; AND JOHN McLUCAS, PRESIDENT, WORLD SYSTEMS DIVISION, COMSAT

STATEMENT OF ROBERT CORELL

Dr. CORELL. Thank you very much, Chairman Gore, and

committee members. I do appreciate the opportunity to appear before you today to discuss a number of these vital questions that have already been addressed with such care and eloquence.

While from my perspective the impetus for these discussions emanates from the drafting of a new Executive Order with regard to national security information, it is clear that the issues being addressed have much broader origins.

As you indicated, I am here in behalf of the National Association of State Universities and Land Grant Colleges, as well as the Sea Grant Association, the tradition of which is well known to this committee. The Sea Grant colleages, on the other hand, are somewhat younger in their origin, as they are dedicated to research, education and public service with respect to our ocean resources.

Further, to provide another context, I am a Professor of Mechanical Engineering at the University of New Hampshire, as well as directing its marine and sea grant college programs and, maybe more importantly to this discussion, conduct a major research laboratory that is dedicated to high technology with particular focus on underwater robotics for ocean science, military applications, and industrial utilization. It is from these vantage points that I wish to address you today.

Executive Order 12065 and its related laws and regulations provide a broad spectrum of authority for federal agencies to control national security information, both generated within and outside the government. The balancing test inherent in Executive Order 12065 in my opinion provides the essential context for determining access to vital information. I strongly feel that the test is crucial, a crucial mechanism for maintaining our national security, while at the same time providing for an informed and knowledgeable citizenry.

The negative impact American universities and colleges would feel as a result of the trends in information control suggested by the draft Executive Order, and by related controls being implemented by the Executive Branch of government, in my opinion, will be profound. Our nation has grown and prospered because of its science and technology, the preeminence of which has depended historically upon the free flow and open exchange which has been well documented by other testimony, in my opinion, this morning. Without this free flow of information, the development of new knowledge and competitive technology I believe will be extraordinarily difficult. Extensive testimony to this Congress and many documents attest to that assertion.

Recent trends in reducing access to vital information related to our national security has certainly given rise to

a substantial national concern. The Congress, as evidenced by this and other hearings, the National Academy, the AAAS, the Defense Science Board, the professional societies, the press, to only mention a few, each are addressing these issues with serious concern.

At the base of all this, in my mind, is a very crucial idea. It is that information is itself knowledge. Even more importantly, the very power that enables institutions to function is based upon that knowledge. Governments function because of knowledge derived from vital information. Industries grow and expand because of the information-knowledge connection. We, as private citizens, live our lives more creatively, effectively and productively if we have open access to information and the knowledge generated therefrom. In my opinion, the genesis of the national concern over the draft order and reduced access to information is this information-knowledge-power triad.

Several weeks ago I became aware of a revised Executive Order. After reviewing a draft, I became acutely aware of a dramatic change in the tone of that order and of its fundamental hypothesis. The draft reverses trends well established by the three previous Executive Orders.

The record in the Congress concerning these vital matters has been well established and documented. For example, the Committee on Governmental Operations held a hearing on March

10th that provide substantial and well-articulated testimony about the crucial issues relating to the draft order. I would like to note particularly the testimony of Professor Mary M. Cheh. She spoke insightfully about the problems that grow out of this new draft. She discussed effectively the dangers of erring in the direction of secrecy. The Congressional Record, containing testimony of individuals on this committee and others, is filled with many excellent examples of the problems that access to national security information is posing for our nation.

If one could be assured that national security information were to be classified in only those cases which clearly and unquestionably threaten our national security, and further, if there was a clear and common understanding of what we mean by national security, I don't think we would be here today. It is the human interpretation of that matter that complicates this whole issue.

There are some sectors of our society that feel that new and substantial restrictions are required to protect the security of our nation. Others feel that openness is the central ingredient to national growth, development, and even survival. These are tough questions, I believe, and maybe even unanswerable ones. Therefore, Mr. Chairman, and committee members, I would like to propose a relatively simple but, I hope, constructive suggestion.

We engaged in a life-threatening war about 40 years ago. During that time, the role and importance of national security information became crystal clear. In the world of nations, we were young, and in many ways extraordinarily naive, concerning the relationship between information and national security. As a consequence, laws were passed and a first Executive Order on National Security was written. In the ensuing time, other pieces of legislation were enacted, well known to this committee, from the Invention Secrecy Act of 1951 through the Export Administration Act and so forth and many others. These have been government's response to a need to effectively control information and, I believe, therefore, knowledge, to our best national interest. I suggest that each of these Acts, regulations and Executive Orders were often prepared in direct response to some specific problem deemed vital to our national security.

Since World War II those items of information vital to our national security, and those items of information vital to the growth and vitality of our nation, have become so intertwined that it is almost impossible to separate them. The distinction is almost imperceptible. The simplicity inherent in a World War II intelligence problem is no longer present in a world filled with high technology, computer systems, complex manufacturing systems, sophisticated communication capabilities, microelectronics and the like.

In short, that information which is vital to our national security is also vital throughout the industries and institutions of our country.

It is out of these perspectives that I believe it is time to pause, not to pass or issue new Executive Orders, or suggest new pieces of legislation to control information, but to place the highest priority on a far-reaching national assessment of the role that information has in our national security and will have in the future vitality of this democracy. I suggest the Congress, in concert with the President of the United States, establish a national commission to address the problems we are discussing today. Such would provide structure and form to the issues that we are addressing on a nationwide basis.

The commission might examine the various laws, orders and acts which bear upon these issues and draw out those essential ingredients that truly affect our national security. Only after a careful analysis will we be able to sure that regulations protect that which needs protection, leaving the greatest possible latitude for intellectual, economic and social development. A thoughtful and comprehensive assessment will provide the foundations that will determine the health and strength of our country for generations to come, I believe.

Such a commission would necessarily be composed of the

Congress, the Judiciary, the military planners, members of the national security community, leaders of industry and government, representatives of the academic world, the free press, and other equally important sectors of this nation.

I wish to support strongly the National Academy of Sciences and do not wish that this suggestion detract from the importance of that. In fact, it could build upon and benefit substantially by the work of the National Academy.

The timing is right, and the needs are clear. Many sectors of our society are vitally concerned that these issues be fully addressed and resolved. The concern which has been so strongly expressed during the past week suggest we cease an opportunity to bring a sense of wholeness to our national security information problems, instead of the piece-meal approach that I perceive to have taken place in the past four decades. The work of such a commission could lead to regulations that could effectively address our national security needs while neither undermining the fundamental precepts of our democracy nor inhibiting the growth of science and technology. In my opinion, this should be given the highest priority of government and should be addressed immediately.

I am very grateful for the opportunity to meet and talk with you today. As I have prepared for this session, I have been increasingly overwhelmed by the fundamental nature of

the discussions in which we are engaged. It is my sincere hope that the collective wisdom of Congress can be brought to bear in such a way that we address these issues directly and comprehensively, and that out of these hearings and the actions that I hope you and your colleagues will take, our nation will bring unity and a national understanding to the control of national security information and its subsequent impact on the knowledge base of our country.

Thank you.

[The statement of Dr. Corell follows:]

********** INSERT 2-1 **********

Mr. COHE. Thank you very much for an excellent statement.

I would like to hear next from Dr. Edward Gerjuoy from the University of Pittsburgh, and representing the American Physical Society.

Dr. Gerjuoy, welcome.

STATEMENT OF EDWARD GERJUOY

Ger. As you were informed, I am testifying today as a representative of the American Physical Society, in my capacity as immediate past chairman of the Society's panel on public affairs.

The American Physical Society, with over 30,000 members, is the largest organization of professionally active physicists in the world. The Society's objective, explicitly stated in its constitution, is the advancement and diffusion of the knowledge of physics. This object is furthered in very large part through the meetings and publications the Society maintains. Each year the Society conducts a variety of meetings with a total attendance this past year of about 20,000. The Society also publishes a number of physics journals, including the Physical Review, probably the most widely read and most prestigious physics journal in the world.

For these reasons, but also because the Society and its

members are genuinely devoted to and have worked for this nation's welfare, the American Physical Society has been concerned about recent attempts to restrict the flow of scientific information. The Society has formally expressed its views on proposed export controls in a letter to George Keyworth, Director of the Office of Science and Technology Policy. However, the Society has not had the opportunity to formulate precisely its views on the latest revisions to President Reagan's draft Executive Order on National Security Information. Therefore, my presentation today of the American Physical Society views concentrates on export control issues.

I am confident, however, that the Society's views on the general subject of the impact of national security consideratins on science and technology, when formulated, will be well indicated by the overall tenor of my remarks on the more specific export control problem. I am equally confident that my testimony will be supported by a very large masjority of the members of the American Phsical Society.

Now, neither the American Physical Society nor I adhere to the doctrinaire view that there should be no export controls. Of course, governerment controls on exports of military weapons, or their blueprints, are needful to our national security. But weapons are things. The community

of American physicists accepts the need for export controls on things--equipment, commodities, devices--that have the ''capacity for substantial utility in the conduct of military operations.''

In the past two years, however, the federal government has been attempting to extend its export controls from well-defined categories of things to very broadly and correspondingly vaguely-defined categories of scientific and technical information, termed ''technical data'' in the export regulations.

These regulations also define ''export'' very broadly. The present regulations say that export of technical data may occur through ''oral exchanges of information in the United States or abroad, or through the application to situations abroad of personal knowledge or technical experience acquired in the United States.''

In other words, the government apparently is proposing to create a vast new category of unclassified yet somehow restricted information, open to all American citizens, but closed to foreigners without federal authorization. Forbidden exports would include oral as well as written communications to foreign nationals.

The American Physical Society does not quarrel with the government's objective--preventing the spread of high technology which could make a significant contribution to

the military potential of unfriendly nations. However, the Society does question whether the government's present approach to this objective can achieve its goal without impeding the continued progress of American science and thereby counterproductively weakening rather than strengthening this nation.

In particular, the control measures will very likely greatly hamper the free exchange of scientific information between our own nationals without greatly diminishing the flow of such information to the Soviet Union. The Soviet Union trades with and receives technical data from Western Europe and Japan, which together have a very significant scientific and technological base. But the hampering of scientific communication between Americans may very greatly damage American science which has flourished in our open society.

In the nearly 40 years since World War II, Soviet science, like Soviet society, has been closely controlled. Nevertheless, by any reasonable criterion, the United States continues to be scientifically and technologically ahead of the Soviet Union. The very reason the government gives for the proposed export controls, that the Russians desperately seek our science and technology, is evidence that we have kept ahead.

Moreover, it is very hard to know what information should

be restricted. For example, the paper that describes how a laser might be built, published in the Physical Review in 1958, and which eventually earned its Bell Laboratories author a Nobel Prize, almost certainly would not have been controlled at the time. Nobody visualized what a laser could do, and most people that that actually constructing a working laser would be quite difficult, if not impossible. Nevertheless, a year-and-a-half later, a working laser was constructed by a Hughes Aircraft group in California, not the original Bell Labs group, mind you, but by a group which was hardly known to the Bell Labs group.

So I ask the question, isn't it likely that keeping the 1958 Bell Labs paper secret, and hoping the Russians wouldn't think of a workable laser design, would have been a poor guarantee of our staying ahead than the course we actually took, namely, letting the design be published and relying on the rapid response of our open scientific society to keep us in the forefront should lasers prove to be militarily important, as they, indeed, turned out to be.

Therefore, one has to ask, why tamper with scientific practices that have kept us ahead. Why risk the duplication of effort, the false starts that our present open system of scientific communication helps to avoid. Why risk the alienation, the loss of pleasure in doing research, the migration of scientists to other endeavors, that an

extensive system of bureaucratic controls on publication might foster on American scientists. Why risk making it less likely than even now that American high school graduates will be impelled to go into science instead of going into other areas, as they presently seem to want to do.

The administration should agree that it bears the burden of proof that the controls it proposes are necessary in general and in specific areas. The American Physical Society especially stresses that at the very least, if the administration continues to insist that it must have new regulations controlling the transfer of technical information, then these regulations should be prepared in continuous consultation with representatives of the affected scientific, educational and industrial communities, and not just by government agencies alone.

The government should also recognize that the American scientific community is as patriotically dedicated to our American way of life and to keeping the United States secure against military threats as any segment of this nation's society. Therefore, the administration should pay very serious heed to the scientific community's knowledgeable warnings about the dangers to our science inherent in the newly proposed controls, and likewise should heed the informed warnings of American's equally patriotic and

dedicated educational and industrial research communities about the dangers posed to them.

Now, before closing, I want to point out that my testimony deliberately has made no reference to the possibilities that the administration's proposed information controls are unconstitutional or may jeopardize the postures the United States has adopted concerning violations of human rights by the Soviet Union. I am not unaware of or indifferent to these possibilities, but I prefer to leave them to other witnesses. My case is that the proposed information controls are unwise and will be harmful to the United States irrespective of constitutional and human rights considerations, and this is the only case I have tried to make.

I add, after hearing the previous testimony, that evidently the point of view I have espoused is very close to Dr. Rosenzweig's, and if I had to summarize my testimony in a few words, I would say ''If it's not broken, don't fix it.''

The American Physical Society and I thank you for this opportunity to testify.

[The statement of Dr. Gerjuoy follows:]

********** INSERT 2-2**********

Mr. GORE. Thank you for a fine statement. We will hold our questions until the panel is completed.

Dr. John McLucas, President of World Systems Division at COMSAT, will go next. And I might note for the record that you have seen this subject from the other side of the fence as Secretary of the Air Force, and we are delighted to have your testimony here today, Dr. McLucas.

Please proceed.

STATEMENT OF JOHN McLUCAS

Dr. MCLUCAS. Thank you, Mr. Chairman.

Today we have heard very often the word ''balance'' as principally a term to indicate the balance between national security interests and private interests of some of the other parties affected by any changes in either the laws or regulations affecting transfer of information.

As you have pointed out, I think I am in some balanced position myself. I have 16 years in government and 20 in private industry.

I am speaking here today on this particular panel as the only spokesman from industry. I should qualify my remarks by saying that I don't think I am a typical industrial spokesman. I'm in the communications business and this is sort of a strange animal in itself. And so, in order to get

the views of industry, I don't think you should rely on me alone.

We are also speaking here today because we are involved in technology transfer outside the United States. Our business is the export of data, technical data, and consulting services, whereby we assist other nations in taking advantage of space technology and specifically communications satellite technology.

As everyone knows, the communications business is an infrmation flow kind of business, so it seems particularly relevant that we include our kinds of activity in the review which you are conducting.

Mr. GORE. Dr. McLucas, let me just say for the record that we invited the U.S. Chamber of Commerce to come and they expressed the view that they really didn't want to address this directly in this hearing, that it involves the government and university community predominantly. But we are delighted to have your unique perspective on the issues, so please proceed.

Dr. MCLUCAS. Thank you.

As you all know, COMSAT is the U.S. representative designed by statute in both INTELSAT and INMARSAT communication satellite organizations. These are international bodies with in one case 106 members, and the other with somewhat less. But in any case, we deal in our

relationships with both INTELSAT and INMARSAT as more or less the leading exponent of satellite technology. So far we have been able to maintain the technical lead in advising INTELSAT in particular on which direction they should go in future systems. INMARSAT being a younger organization, we have had less history of working with them.

I should point out that while we are dealing in advanced technology, the systems that I am talking about are not military systems, and so we don't claim to be dealing in military technology. But in the process of dealing with the U.S. Government with respect to the data which we generate, we find ourselves in consultation with the Office of Munitions Control and the Department of Commerce.

One point which I meant to mention earlier is that the statute also demands of us that we help the United States to bring the advantages of modern technology to be used more broadly throughout the world. It is somewhat similar to the Space Act which includes the concept that the U.S. will not only maintain leadership, but will make the benefits of that technology available to the world at large. The Satellite Act contains some of those same provisions.

In our case, what we are trying to do as we discuss this subject is to balance the legitimate interests of U.S. industry to export their goods and services versus national security objectives of protecting the national interest.

But at the same time I should point out that COMSAT has another interest, namely, we operate something called the COMSAT Laboratories which we think of as one of the most advanced communications laboratories in the country, so we are very concerned with any restrictions that might be placed on the activity there.

Now, let me talk for just a minute about some of the problems we have in dealing with the current environment having to do with technology export, and how we think solutions might be found.

First of all, I think that any solution must include much interaction between the government side and the private side, particularly universities, laboratories, and industry, and if as good enough dialogue is maintained among all these parties, I would hope that we will arrive at reasonable answers.

As we have seen the regulations that now exist, and as we have tried to work within them, we are struck by some of the difficulties of dealing in that system. Specifically, we think that we could have a much more simple scheme of reviewing the material which is of concern to the reviewing agencies and more specific lists of critical technology. We have trouble sometimes knowing whether the technology we are talking about falls within or without the proscriptions that have been laid down. We think that we are fairly

sophisticated industrial types, and yet we have trouble dealing with them, and we suspect that other people in industry have similar difficulty. Could they not be written in a more easily comprehensible form.

Many people might decide they wouldn't want to start down a given road if they knew what all the complications were of the path they are about to embark on. So we would propose that simple guidelines, that lists of critical technologies be such that the ordinary person could deal with them, and especially we would propose that lists of critical technologies require frequent update.

Now, many of these things gradually fall into the public domain, and it is not productive to continue restrictions on items which have already become more or less common knowledge.

Another problem we have is that our requests frequently receive very slow attention. It is not uncommon for us to wait a year or two for answers to some of our requests for release of information. If you're acting in a competitive world, a year or two of delay can certainly cool off the order of potential customers.

As we have dealt with the individuals in the government on these subjects, we find that frequently dealing with our problems is as collateral duty for the people in the government. It seems that if this is an important activity,

somehow the government agencies could be staffed and funded and organized in such a way that this type of review could be conducted more quickly.

Alos, we must submit in each case a full contract about what we propose to do, and this is very late in the game. It means you have sat and negotiated with foreign parties and it comes as a great shock to some of them sometimes to find that in spite of the existence of this contract there are still further impediments. So it would be better if we could get a tip off in the beginning that the road we are about to embark on is not going to be approved.

Fortunately, because of my previous government associations, I think I am in a better position than most to explore this informally. But I can see that it might be a real impediment to people who aren't so familiar with Washington.

I am struck by the thousands of technical subjects that the government would have to deal with in order to do a good job of reviewing technology transfer. I don't envy those whose lot it is to police what goes on between the thousands of companies in this country who do export and the potential recipients on the othr side. And yet, it seems to me that somehow those lists of technology have to be narrowed down and made much more specific. It is inconceivable that the government can review all technological activity in the U.S.

and maintain a position on whether that particular technology could be exported.

Now, let me say one more word about our laboratories. The COMSAT Labs, as I have said, regards itself as one of the most advanced in satellite communications technology, and we make our advances not only through our internal activity but by keeping in touch with the broad scientific community. It is inconceivable to all of us, I think, to imagine a system whereby we could operate under controls and still make the advances that we do. Although our people are smart, they don't have any patent on knowledge in the satellite field and we learn a lot from others, both through participation in meetings and conferences, and the exchange of private views on all the rest.

Speaking again from the industrial side, I think that U.S. industry finds it very difficult to compete in many high technology areas, and this is sort of as contradiction in terms. On the one hand we think we are ahead of everyone else, and at the same time we see a number of our friends, other countries, competing for business overseas which we would like to get. That demonstrations once again that scientific knowledge and technical acumen is an international enterprise and that we are hard pressed many times to stay ahead of people in other countries in their ability to deliver high technology at a price.

With all the impediments that we have, the competitive disadvantages sometimes of higher labor rates and all the rest, it is no advantage to us have the U.S. Government impose other impediments to U.S. business obtaining overseas customers.

I will just put in a P.S. to Dr. Frank Press' comment about the existence of his committee to explore this whole problem. I happen to serve on that--it's called the COSEPP Committee--which will receive the report of the panel which has been established. I look forward to some great enlightenment when that panel has submitted its results.

Thank you, Mr. Chairman.

[The statement of Dr. McLucas follows:]

********** INSERT 2-3 **********

Mr. GORE. Thank you very much, and thanks to all of you.

Mr. Walgren.

Mr. WALGREN. Thank you, Mr. Chairman.

I wish I had been able to be here throughout the morning to hear the presentations, so I will be brief.

Dr. Gerjuoy, I am interested in your reference to the impact on engineers that might occur if we were to have a system of voluntary publication censorship. It is more implied, I think, than developed in your statement.

Do you feel that a voluntary censorship system would really impede us across the board, particularly in the engineering area where we have so much to do in this country.

Dr. GERJUOY. Well, in general, I take it as a given, that if you impede communication between engineering research scientists, just as being physical scientists, you have to expect that you're going to cause duplication, that you're going to cause people to take false starts, and you're also going to lose certain kinds of satisfactions which Congressman Brown refered to very eloquently, I thought, in the testimony inserted in the Congressional Record on February 25th of this year.

People do get a great deal of satisfaction out of being able to talk to their colleagues, to have their work appreciated, to see their work published, to feel that they

have beaten out the whole world in a problem and know that the whole world knows about it. This is all part of it.

Now, a great part of our university training is working with graduate students, and you don't develop these graduate students in this country unless they have some real desire and hope that a certain kind of life will accrue to them if they do go on to science and engineering.

I think it is clear that the kinds of restrictions that are being talked about in this society are of the kind that normally would tend to detract rather than attract young students to the sciences and to engineering. All this together I think has to have a deleterious effect.

Now, one cannot do it quantitatively. As I said in my testimony, it is not a quantitative affair. One has to have a gut feeling. But I think I really am representing the gut feeling of the engineering and scientific community in very large measure, and I urge, therefore, that somebody listen. I mean, there is a certain kind of merit in respecting this kind of feeling in a community which is patriotic like everybody else.

Mr. WALGREN. And then let me ask a question to the panel as a whole.

There was talk this morning about the need of the various societies to make the first suggestion or to join in an evaluation or what might be done in this area of censorship

and restraint.

Have any of your organizations been asked to review any of the administration's suggestions for restraint in this area, or has there been nothing coming from the administration thus far?

Dr. GERJUOY. In my role as Chairman of the Panel on Public Affairs last year, and continuing to follow this, they have actually engaged in a dialogue with various administration people and DOD and NSF and so on, and trying to get this sort of review started.

Now, I think it is going forward. I do want to say that I am encouraged--For instance, in setting up the forum, which we heard about this morning, I think that is a very positive approach. The Department of Commerce has had conversations with John Crowley, who is Executive Director of the Association of American Universities, to set up a similar dialogue with Commerce. I don't know of anything specifically with State as yet.

I am disappointed that the forum has not had a wider representation and is concentrated all in the university community, but there has not been a specific approach asking us to review. The point I am trying to make is that there is a tendency for these to get set in concrete, and it may be of interest that one of the President's men who reviews regulations--I ought to have his name; I have his note here--

has said that he thinks it would be a very good idea if the administration did adopt an approach of having regulations of this kind reviewed before they are promulgated. I can give you a cite to that speech which was made in October.

Mr. GORE. Thank you.

Others on the panel?

Dr. CORELL. Not to my knowledge has there been an approach to the Land Grant or Sea Grant university associations. I know it is true of the Sea Grant community. I will double check for you with Robert Clodius, the President of the Land Grant. But to the best of my knowledge--and we have had some discussions--the issue did not refer to them. So to the best of my knowledge, there has been no contact with those two associations.

Dr. MCLUCAS. I don't know of any contacts, Mr. Walgren.

Mr. WALGREN. Thank you, Mr. Chairman.

Mr. GORE. Mr. Brown.

Mr. BROWN. Mr. Chairman, you referred earlier to the fact that the Chamber of Commerce had not chosen to appear at these hearings, which they haven't. But I have two letters, one earlier this month, and one in a similar situation a year ago, outlining their basic position with regard to restrictions on technological trade. I would like to ask unanimous consent that these two letters from the President of the U.S. Chamber of Commerce be included in the record as

an indication of their position on this issue.

Mr. GORE. Without objection, we will put them in the record.

[The information follows:]

********** COMMITTEE INSERT **********

Mr. BROWN. Dr. McLucas, I have been concerned about some specific cases of where we may have overly classified technical information to the detriment of our private industrial or economic development. I would like to specifically raise the issue which is going to be debated fairly extensively in the near future, having to do with the classification of Earch resources satellite observing technologies, which I think you are fairly familiar with.

As you know, we have a large amount of classified technology in this area, and then we have the unclassified LANDSAT technology. We're in a situation where we perhaps might be on the verge of large-scale commercial applications and where we face a developing international competition from our friends, not our enemies, in this case.

I wonder if you would comment, without being exhaustive, as to whether or not the existence of a large body of classified technology and data here, what the effect may have had on the development both of technology and policy with regard to unclassified civilian application in this field, both domestically and overseas?

Dr. MCLUCAS. Well, Mr. Brown, I think that the existence of a large body of classified technology has had an effect in, shall I say, teaching industry how to extrapolate the technology into new areas. It seems to me that the support which the government has given to certain technologies of

that type could not have been other than helpful to the industry as a whole, and there is bound to be some spin-off from that in spite of the very security restrictions that apply.

I think that the fact that it is known that high resolution photography has military significance has worked to the detriment of proper exploitation of LANDSAT type of material. It seems to me that again we have to look for that balance, and in my view, the balance can only be struck by people who have a broad knowledge of the civilian needs and also the military capabilities and the military threats that the country faces. But I believe that more should have and could have been done to make LANDSAT system more productive and that the results of those more productive systems could have been very helpful in a number of ways to the economy at large.

Mr. BROWN. I have a feeling--and I'm speaking in ignoranc of the classified information, of course--that the considerations which may have led to this classification were in the area which Admiral Inman described as relating to the national interest rather than the national security, and yet I have no way of determining that absent access to the full background on this development. That is one of the factors that leads me to raise the question of how important decisions were to be made in this area.

This committee, of course, has a long standing and a very intense interest in the commercialization of civilian space technology, and the question that arose in another subcommittee is whether this commercialization of civilian space technology was being impeded or not impeded as the case may be by the existence of this body of classified technology.

Dr. MCLUCAS. If I may say another word on that, as I said earlier, I think the guidelines on what constitutes technology which should be closely held should be frequently updated. As the general technical community advances in making higher levels of technology practical, those guidelines should shift and recognize that what was once considered high resolution photography is now just ordinary material.

Mr. BROWN. Let me ask you another question that again borders on the national interest versus the national security area.

In the field of communications, this country has long been a strong supporter of what we call the free flow of information and has run afoul of the less developed, group 77 specifically, on this concept of the New World Information Order, that they should be able to control the flow of information essentially.

I raise the question with you as to the posture that this

country is placed in if we decide that they were right after all and that we should emulate them by controlling the free flow of information in the sense that we are seeking to put restrictions on this hemorrhaging of scientific and technical information that might be adversely used. Of course, that is exactly the argument that they use in wanting to curtail the flow of information from their countries, that it would be deleterious to their domestic well being.

Can you say something about that apparent contradiction?

Dr. MCLUCAS. Well, Mr. Brown, I view with the same alarm as you any proposed change in our posture in that respect. I am very proud of the posture that we have taken to date, and I certainly hope that it can continue and that people like you and others on this committee would use their influence to keep us on the straight and narrow here.

Mr. BROWN. We hope our influence can have that effect, Mr. McLucas.

I have no further questions, Mr. Chairman.

Mr. GORE. Well stated.

I would like to thank our witnesses--Mr. Corell, Congressman Judd Gregg has made the committee well aware of your expertise and he wanted to say those kind words publicly. He has an obligation at another committee. He was earlier here, of course, and wanted to be back for this

panel but could not.

I would like to thank all of you for joining us and, indeed, the other witnesses who have been with us throughout the day as well. We will continue our interest in this subject and thanks to all the witnesses.

The hearing is adjourned.

[Whereupon, at 1:06 p.m., the subcommittees adjourned.]

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